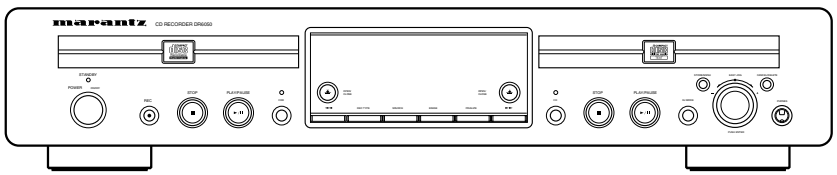
# Service Manual

## DR6050 /F1N, /K1G, /N1G
## /F1B, /K1B, /N1B, /U1B
## Compact Disc Recorder

DR6050



REMARK : This service manual explains them by extracting specifications designed for the model DR6050 only. The explanation for CD-R module "MAR775" (Loader : CDL4009' + CD-R Main board) is not mentioned on this service manual.

The CD-R module information is described in the service manual of CD-R modules <MAR770/MAR775>.

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Please use this service manual with referring to the user guide ( D.F.U. ) without fail.
修理の際は、必ず取扱説明書を準備し操作方法を確認の上作業を行ってください。

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# DR6050


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KOREA
PHONE : +822 - 3232 - 155
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### SHOCK, FIRE HAZARD SERVICE TEST :

**CAUTION :** After servicing this appliance and prior to returning to customer, measure the resistance between either primary AC cord connector pins ( with unit NOT connected to AC mains and its Power switch ON ), and the face or Front Panel of product and controls and chassis bottom.

Any resistance measurement less than 1 Megohms should cause unit to be repaired or corrected before AC power is applied, and verified before it is return to the user/customer.

Ref. UL Standard No. 1492.

In case of difficulties, do not hesitate to contact the Technical Department at above mentioned address.

# 1. Servicing the DR6050

## 1.1 INTRODUCTION:

The DR6050 is the consumer version of a CD recorder, this means that the SCMS (Serial Copy Management System) is included. The DR6050 can only record on the Audio CDRs (Consumer Use).
The DR6050 is suitable for recording and playback of CD-RW discs (CD-Re Writable disc).

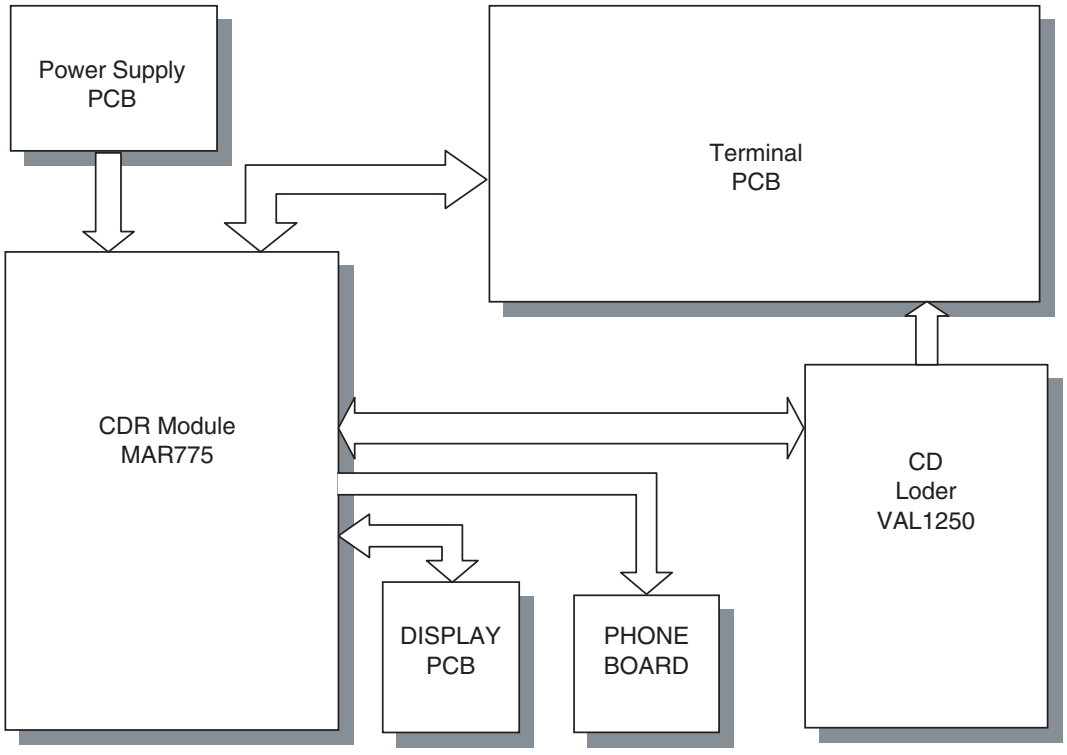
### Playback & Recording and Disc

| Disc / Player/Recorder | CD | CDR | | | | CD-RW | | | | SCMS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Consumer Disc | | Professional Disc | | Consumer Disc | | Professional Disc | | |
| | | Finalized | non Finalized | Finalized | non Finalized | Finalized | non Finalized | Finalized | non Finalized | |
| **Audio CD Player** Current products Ex:CD-17 | **P** | **P** | no | **P** | no | no | no | no | no | - |
| **Audio CD Player** CD-RW playback Ex:CD-17MK II | **P** | **P** | no | **P** | no | **P** | no | **P** | no | - |
| **CD-RW Recorder** For Professional Ex:CDR630/640 | **P** | **P** | **P/R** | **P** | **P/R** | **P/R** | **P/R** | **P/R** | **P/R** | no |
| **CD-RW Recorder** For Consumer Ex:DR6050 | **P** | **P** | **P/R** | **P** | **P** | **P/R** | **P/R** | **P** | **P** | **YES** |

Consumer : For Digital Audio
Professional : For General use (Including PC)
P : Playback
R : Recording

## 1.2 OPENING THE PRODUCT:

The product can be opened by removing the top cover (6 screws). Once the product is opened one can have access to the several PCB's and the main module.




Below the several PCB's and it function and service policy will be discussed:

### 1.2.1 CDR loader (CDR main module CDL4009 or MAR770):

**This complete CDR loader is considered as not repairable in the field.** therefore this module will be repaired centrally. A module exchange procedure will be set up for this purpose. The module can be removed from the product by removing 4 screws and the transformer (see demounting the CDR module on page 1-7), and loosing the connectors.

This module is the complete CD recorder, it contains the following parts:

CD Mechanism (CDM4009'). Underneath this mechanism a PCB is mounted which is adjusted to the mechanism (laser current settings are stored in EEPROM).

Loader Assy. This mechanical assy takes care for the tray control.

Main PCB. This PCB takes care that the (analog or digital) signal to be recorded is converted into a suitable signal which can be recorded on the disc.

Digital signals with an other sampling frequency then 44.1kHz will be converted in the sample rate converter (DASP) to 44.1kHz.

Analog signals will be first converted into a digital converter by the AD converter.

This PCB also takes care that the signal from the CD (playback) is converted into a suitable digital signal (or analog via the DA converter).

The main microprocessor controls the several functions of this PCB.

### 1.2.2 Power Supply PCB.

This PCB contains the Power SW, which is jointed the Power bottom on the front panel. This PCB consists of power supply part. The power suppluy part delivers the several voltages for the diffrent PCB in the DR6050. On this power supply one fuse (primary side) is mounted on this PCB. All parts are available as spare parts.

### 1.2.3 Terminal PCB.

This PCB coutaius input and output terminals. All parts are available as spare parts.

### 1.2.4 Display Board.

This PCB contains the Display, which informs the user about the status of the recording/playback process and it also takes care for scanning the keys on the front panel. The information from the keys is fed via a $I^2C$ connection to the main microprocessor on the CDR loader module. Information which needs to be displayed is also fed via this $I^2C$ line from the main microprocessor on the CDR loader module to the display controller.
The parts for this PCB are available as service parts so this PCB can be repairable up to component level.

### 1.2.5 Headphone PCB.

This PCB contains the headphone socket.

**IMPORTANT**

In case of replace the CD-R module "MAR775", the initialization is necessary.
Please initialize the CD-R module with following orders.

1. Press the POWER button (POWER ON) while depressing FINALIZE button and REC TYPE button together.
2. FL Display shows;
   WAIT → PGM PROTOCOL → PGM PORT END
3. Press the POWER button (POWER OFF).

Then the CD-R module set up to DR6050 own status.

## 2 TECHNICAL SPECIFICATIONS

**GENERAL**

System ..... Compact disc digital audio
Number of channels ..... 2 (stereo)
Applicable discs ..... CD, CD-R (digital audio), CD-RW (digital audio)
Power Requirement
F version ..... AC 100 V 50 / 60 Hz
K version ..... AC 110 V / 220 V 50 /60 Hz
N version ..... AC 230 V 50 Hz
U version. ..... AC 120 V 60 Hz
Power Consumption ..... 20 W
Operating Temperature . ..... 5 °C - 35 °C
Dimension (MAX)
Width ..... 440 mm
Height ..... 87 mm
Depth ..... 317 mm
Weight ..... 4.4 kg

**AUDIO**

Frequency Response ..... 20 Hz - 20 kHz
Playback S/N ..... 100 dB
Playback Dynamic Range ..... 96 dB
Playback Total Harmonic Distortion ..... 0.003 %
Recording S/N ..... 90 dB
Recording Dynamic Range ..... 92 dB
Recording Total Harmonic Distortion ..... 0.006 %
Analog Output Voltage ..... 2 V RMS
Digital Coaxial Output ..... 0.5 V (p-p) / 75 ohms
Digital Optical Output ..... - 20 dB
Headphones ..... 0 - 5 Vrms / 8 - 2000 ohms

Recording values for line input
Digital Coaxial Input (automatic sample rate conversion) ..... 32 - 48 kHz
Digital Optical Input (automatic sample rate conversion) ..... 32 - 48 kHz
Analog Input ..... 600 mVrms / 50 kohms

Specifications subject to change without prior notice.

## 3. WARNINGS

**(GB) WARNING**
All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wristband with resistance. Keep components and tools at this potential.

**(F) ATTENTION**
Tous les IC et beaucoup d´autres semi-conducteurs sont sensibles aux décharges statiques (ESD). Leur longévite pourrait être considérablement écourtée par le fait qu´aucune précaution nést prise à leur manipulation.
Lors de réparations, s´assurer de bien être relié au même potentiel que la masse de l´appareil et enfileer le bracelet serti d´une résistance de sécurité.
Veiller à ce que les composants ainsi que les outils que l´on utilise soient également à ce potentiel.

**ESD**

**(D) WARNUNG**
Alle ICs und viele andere Halbleiter sind empfindlich gegenüber elektrostatischen Entladungen (ESD).
Unsorgfältige Behandlung im Reparaturfall kann die Lebensdauer drastisch reduzieren.
Sorgen Sie dafür, daß sie im Reparaturfall über ein Pulsarmband mit Widerstand mit dem Massepotential des Gerätes verbunden sind.
Halten Sie Bauteile und Hilfsmittel ebenfalls auf diesem Potential.

**(NL) WAARSCHUWING**
Alle IC´s en vele andere halfgeleiders zijn gevoelig voor electrostatische ontladingen (ESD).
Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen vermindern. Zorg ervoor dat u tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat.
Houd componenten en hulpmiddelen ook op ditzelfde potentiaal.

**(I) AVVERTIMENTO**
Tutti IC e parecchi semi-conduttori sono sensibili alle scariche statiche (ESD).
La loro longevità potrebbe essere fortemente ridatta in caso di non osservazione della più grande cauzione alla loro manipolazione. Durante le riparationi occorre quindi essere collegato allo stesso potenziale che quello della massa delápparecchio tramite un braccialetto a resistenza.
Assicurarsi che i componenti e anche gli utensili con quali si lavora siano anche a questo potenziale.

**(GB) AVAILABLE ESD PROTECTION EQUIPMENT :**

| | | | |
|---|---|---|---|
| **anti-static table mat** | large | 1200x650x1.25mm | 4822 466 10953 |
| | small | 600x650x1.25mm | 4822 466 10958 |
| **anti-static wristband** | | | 4822 395 10223 |
| **connection box** (3 press stud connections, 1M ) | | | 4822 320 11307 |
| **extendible cable** (2m, 2M , to connect wristband to connection box) | | | 4822 320 11305 |
| **connecting cable** (3m, 2M , to connect table mat to connection box) | | | 4822 320 11306 |
| **earth cable** (1M , to connect any product to mat or to connection box) | | | 4822 320 11308 |
| **KIT ESD3** (combining all 6 prior products - small table mat) | | | 4822 310 10671 |
| **wristband tester** | | | 4822 344 13999 |

**(GB)**
Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.
Safety components are marked by the symbol ⚠

**(F)**
Les normes de sécurité exigent que l`appareil soit remis à l`état d`origine et que soient utilisées les pièces de rechange identiques à celles spécifiées.
Les composants de sécurité sont marqués ⚠

**SAFETY**

**(D)**
Bei jeder Reparatur sind die geltenden Sicherheitsvorschriften zu beachten. Der Originalzustand des Gerätes darf nicht verändert werden. Für Reparaturen sind Originalersatzteile zu verwenden.
Sicherheitsbauteile sind durch das Symbol ⚠ markiert.

**(NL)**
Veiligheidsbepalingen vereisen, dat het apparaat in zijn oorspronkeliijke toestand wordt teruggebracht en dat onderdelen, identiek aan de gespecificeerde, worden toegepast.
De Veiligheidsonderdelen zijn aangeduid met het symbool ⚠

**(I)**
Le norme di sicurezza estigono che l´apparecchio venga rimesso nelle condizioni originali e che siano utilizzati i pezzi di ricambiago identici a quelli specificati.
Componenty di sicurezza sono marcati con ⚠

**(GB)** **DANGER**: Invisible laser radiation when open.
AVOID DIRECT EXPOSURE TO BEAM.

**U : VERSION**

**CLASS Ⅲb**
**LASER PRODUCT**

**N : VERSION**

**CLASS 3B**
**LASER PRODUCT**

**(S) Varning !**
Osynlig laserstrålning när apparaten är öppnad och spärren är urkopplad. Betrakta ej strålen.

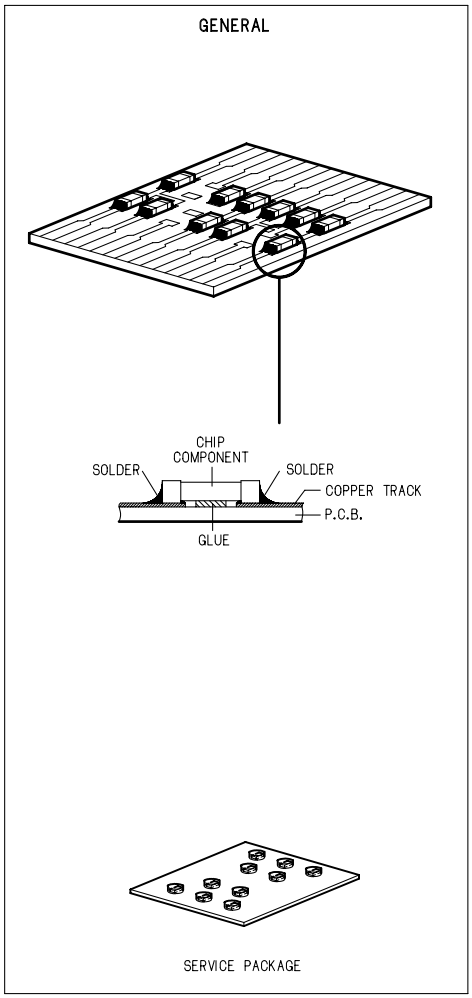
**(DK) Advarsel !**
Usynlig laserstråling ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsaettelse for stråling.

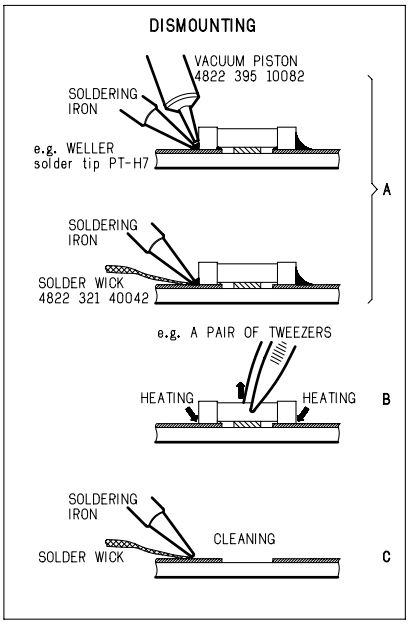
**(SF) Varoitus !**
Avatussa laitteessa ja suojalukituksen ohitettaessa olet alttiina näkymättömälle laserisäteilylle. Älä katso säteeseen !

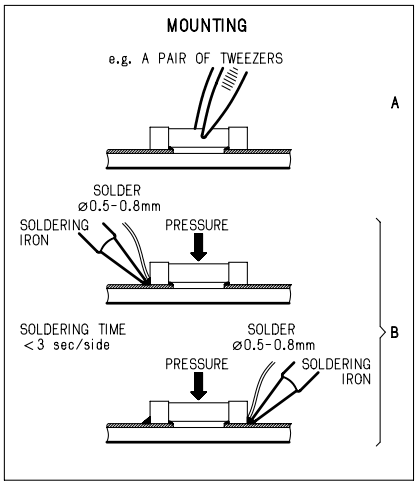
**(GB)**
After servicing and before returning the set to customer perform a leakage current measurement test from all exposed metal parts to earth ground, to assure no shock hazard exists.
The leakage current must not exceed 0.5mA.

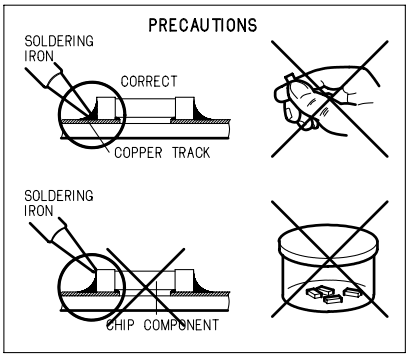
**(F)**
"Pour votre sécurite, ces documents doivent être utilisés par des spécialistes agréés, seuls habilités à réparer votre appareil en panne".

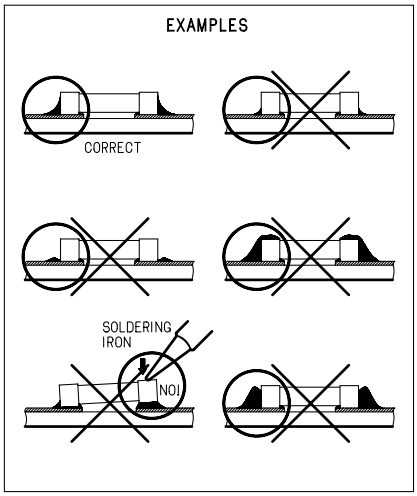
## 4. SERVICE HINTS




## 5. SERVICE TOOLS

| | |
|---|---|
| Audio signals disc | 4822 397 30184 |
| Disc without errors (SBC444)+ | |
| Disc with DO errors, black spots and fingerprints (SBC444A) | 4822 397 30245 |
| Disc (65 min 1kHz) without no pause | 4822 397 30155 |
| Max. diameter disc (58.0 mm) | 4822 397 60141 |
| Torx screwdrivers | |
| Set (straight) | 4822 395 50145 |
| Set (square) | 4822 395 50132 |
| 13th order filter | 4822 395 30204 |
| Hexagon socket screw button (No. 1.5) | |

# 6. Diangostic Software

## 6.1 Dealer mode

The purpose of the dealer mode is to prevent people taking out the CD inside the player at exhibitions, showrooms etc.. This mode disables the open/close function of the player.
The dealer mode can be switched on and off pressing keys [OPEN/CLOSE] and [STOP] of the CDR player simultaneously while switching on the unit. The dealer mode is stored in the flash memory and can only be changed by executing the above actions.

## 6.2 Dealer diagnostics

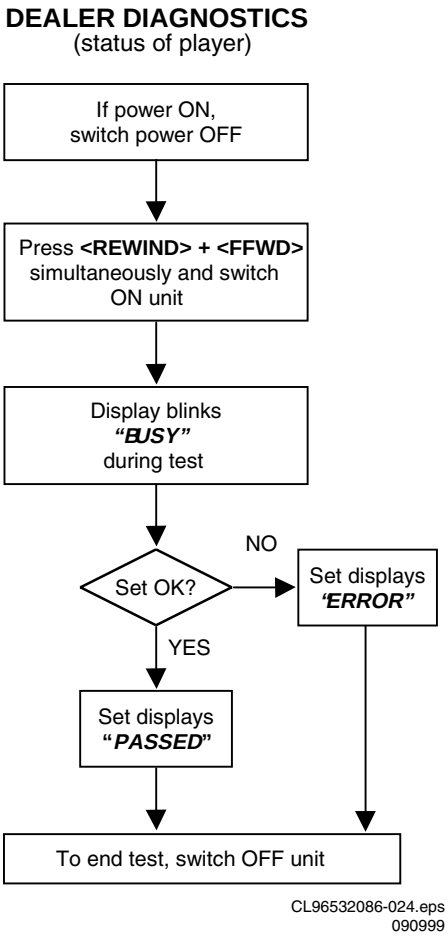



**Figure 6-1**

### 6.2.1 Description

The intention of the dealer diagnostics is to give an indication of the CDR player status. An inexperienced, even non-technical dealer will/can perform the test. Tests are executed automatically without need for external tools or disassembly of the unit. This test checks the CDR main board using the same tests as the electrical service diagnostics program. Only the result of the test, "PASSED" or "ERROR", will be shown on the display. Pressing keys [F FWD] and [REWIND] simultaneously while switching on the unit, starts the test. Switching off the unit ends the test.

### 6.2.2 Requirements to perform the test

- Working keyboard to start up the test.
- Working local display to check the output messages.

## 6.3 Electrical service diagnostics

### ELECTRICAL SERVICE DIAGNOSTICS
(software versions, test for defective components)

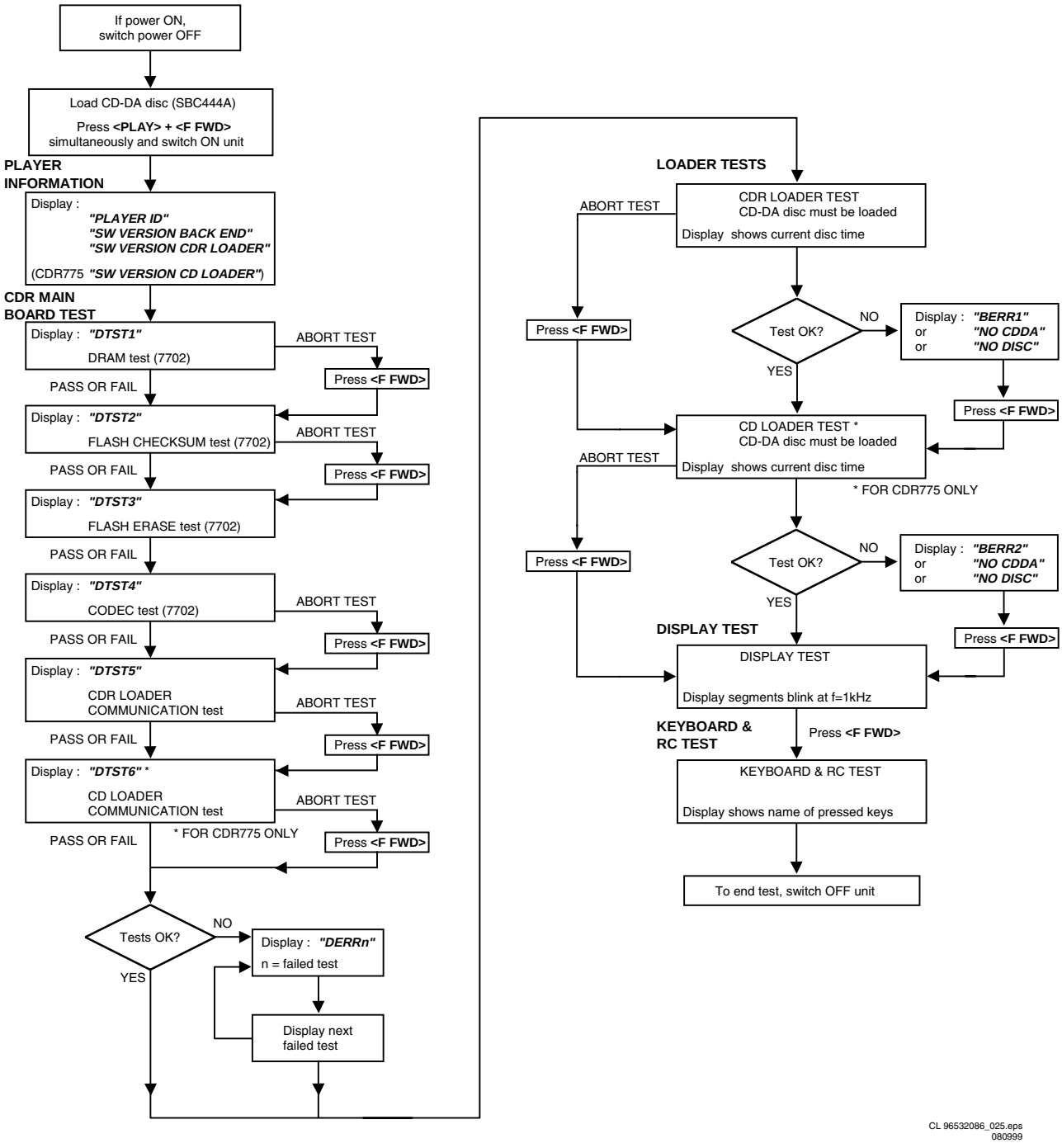



**Figure 6-2**

### 6.3.1 Description

The intention of the electrical service diagnostics is to show the software versions present in the player and to direct the dealer towards defective internal units. The units are : the CDR main board, the CDR loader, the CD loader in case of a DR6050 and the keyboard/display board. A sequence of tests is executed automatically. Some of the tests can be aborted or skipped without the result being taken into account. External tools or disassembly of the unit is not necessary to get the diagnostic information. Pressing keys [PLAY/PAUSE] and [F FWD] simultaneously while switching on the unit, starts the test. Switching off the unit ends the test.

### 6.3.2 Requirements to perform the test

Working keyboard to start up the test.
Working local display to check the output messages.
A CD-DA disc with a minimum of 3 tracks in all trays to perform the disc test.

### 6.3.3 Description of the tests

***Player information***
In this part of the test the following important information can be checked without removing the cover :
Recorder ID.
SW-version back end of player.
SW-version CDR loader.
SW-version CD loader (only for DR6050).

***CDR main board test***
[F FWD] key. The message "DERRn" will be displayed with n indicating the faulty test number.
If one of the tests is aborted with the [F FWD] key, no error message will be displayed for this test. The flash data erase test ("DTST3") can not be aborted !
The CDR main board test consists out of :

*DRAM test*
Display : "DTST1". The DRAM used for buffer management is tested by writing, reading and verifying test patterns.

*Flash checksum test*
Display : "DTST2". This test checks the checksum of the player's SW stored in the flash.

*Flash data erase*
Display : "DTST3". During this test, all temporary information (CDtxt) in the flash is erased.

*CODEC (ADC/DAC) test*
Display : "DTST4". This test checks the CODEC IC by writing, reading and verifying test patterns. The test is not applicable for CDR950.

*CDR communication test*
Display : "DTST5". The communication between the host processor (DASP) and the CDR loader via the DSA-R-bus is tested.

*CD communication test*
Display : "DTST6"). The communication between the host processor (DASP) and the CD loader is tested. The test is only applicable for DR6050.

***Loader tests***
These tests determine if the CDR loader and the CD loader in case of a DR6050 w ork correctly. A CD-DA disc with a minimum of 3 tracks needs to be inserted in both loaders. A disc test is executed to check focus control, disc motor control, radial control and jump grooves control. The disc test is performed by audio play-back of 5 seconds at the beginning, middle and end of the disc.

*CDR loader test*
During the test, the current disc time is shown. In case of an error the message "BERR1" will be displayed and the [F FWD] key must be pressed to continue with the following test. Pressing the [F FWD] key also aborts this test.

*CD loader test*
For DR6050 only. During the test, the current disc time is shown. In case of an error the message "BERR2" will be displayed and the [F FWD] key must be pressed to continue with the following test. Pressing the [F FWD] key also aborts this test.

***Display test***
All segments will blink at a frequency of 1 Hz. Pressing the [F FWD] key will start the next test because the user has to check for himself if all segments work properly.

***Keyboard and remote control tests***
The test will give the user the ability to test every key without executing the function assigned to it. Therefore, the user needs to press every key on the keyboard and the remote control. The display will show the name of the key being pressed. Pressing more than one key at once will give an unpredictable result except for the service combinations : [PLAY/PAUSE] + [STOP], [PLAY/PAUSE] + [F FWD], [F FWD] + [REWIND], [ERASE] + [RECORD], [PLAY/PAUSE] + [RECORD].

## 6.4 Mechanical service diagnostics

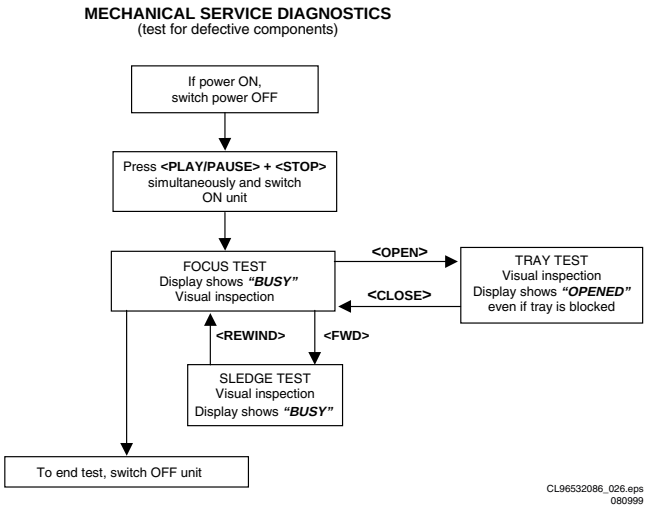



**Figure 6-3**

### 6.4.1 Description

No external tools are required to perform this test. The cover needs to be removed because the user has to check the movements of the tray, focus and sledge visually. Pressing keys [PLAY/PAUSE] and [STOP] simultaneously while switching on the unit, starts the test. Switching off the unit ends the test. In case of a DR6050, one can check the CD loader mechanics in the same way by pressing the above key combination on the CD player keys.

#### 6.4.2 Requirements to perform the test

Working keyboard to cycle through the tests and to start up the test.
Working local display to check the output messages.

#### 6.4.3 Description of the tests

***Focus control test***
The focussing lens is continuously moving up and down. The display reads "BUSY".

***Sledge control test***
After pressing [F FWD] the sledge continuously moves up and down. Pressing [REWIND] stops the sledge at the position it is in and the focus control test resumes. The display reads "BUSY".

***Tray control test***
This test starts from within the focus control test routine. Pressing [OPEN/CLOSE] moves the tray in or out. In the tray open position one can initiate focus and sledge tests by pressing [F FWD]. One has to stop these tests pressing [REWIND] before it is possible to close the tray again. Depending on the action the display reads "OPEN", "OPENED", "CLOSE" or "BUSY".

### 6.5 DC-erase service mode

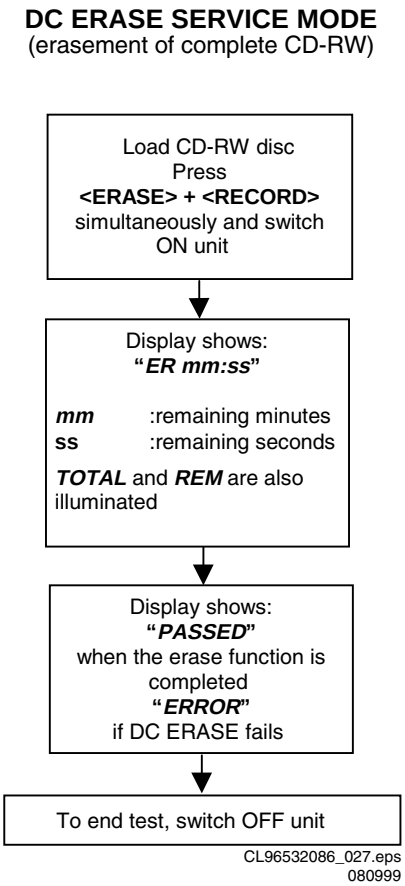



**Figure 6-4**

#### 6.5.1 Description

This test is initiated by pressing [ERASE] and [RECORD] simultaneously while switching on the unit. The player will erase a complete CD-RW disc (including PMA and ATIP lead out area) at speed N=2. The display shows the countdown of the remaining time required for the operation to complete. The format is "ER mm:ss", where "mm" are the remaining minutes and "ss" the remaining seconds. After completion the message "PASSED" is shown, and the player has to be switched off and on again to start up in normal operating mode. Switching off the unit before completion of the test, leaves the disc in an unpredictable state. In such case only a complete DC-erase procedure can recover the CD-RW disc.

#### 6.5.2 Requirements to perform the test

Functional CDR player.
A CD-RW audio disc must be present in the tray.

# 7. Faultfinding trees

## 7.1 CDR-Module

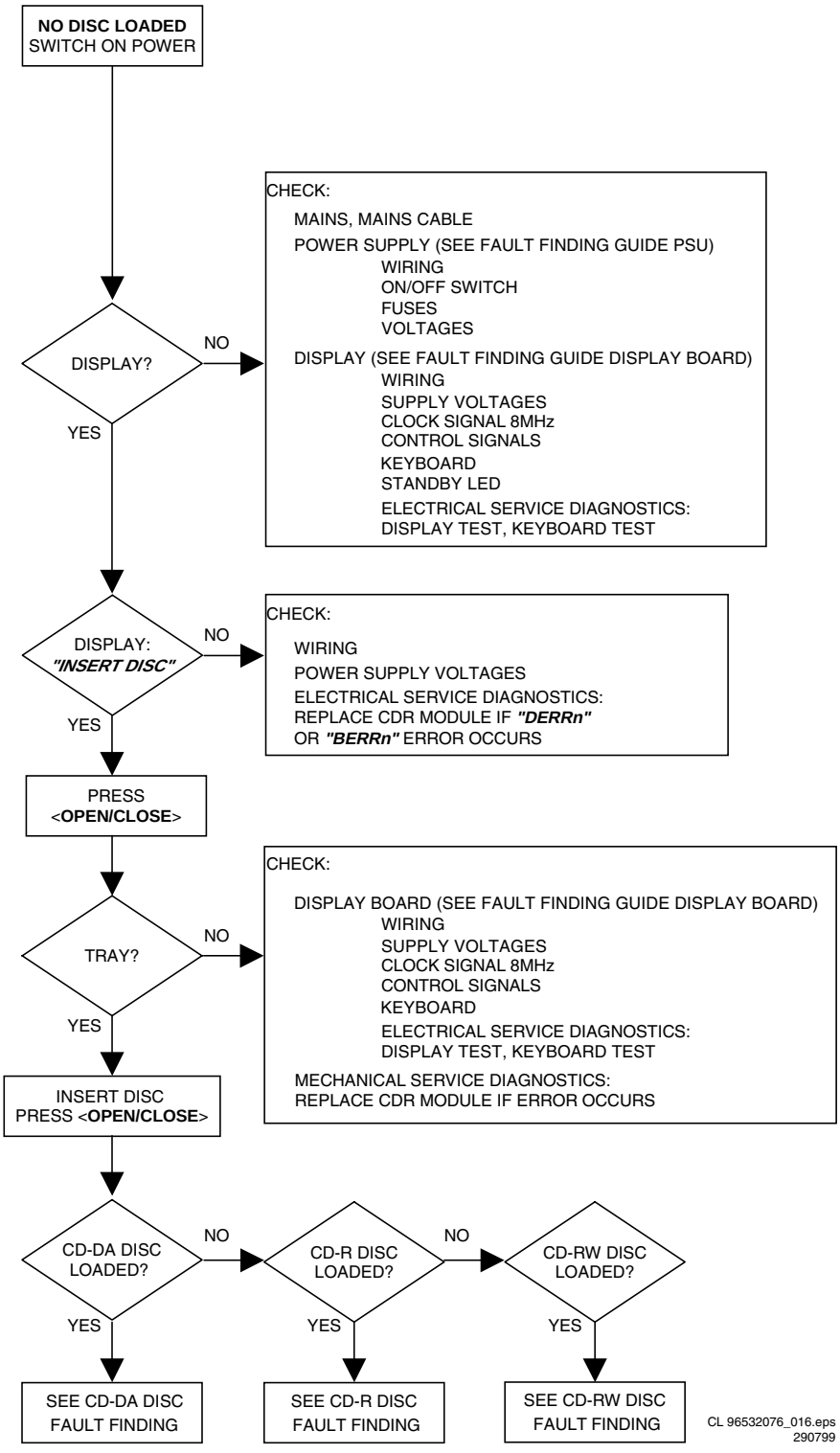



**Figure 7-1**

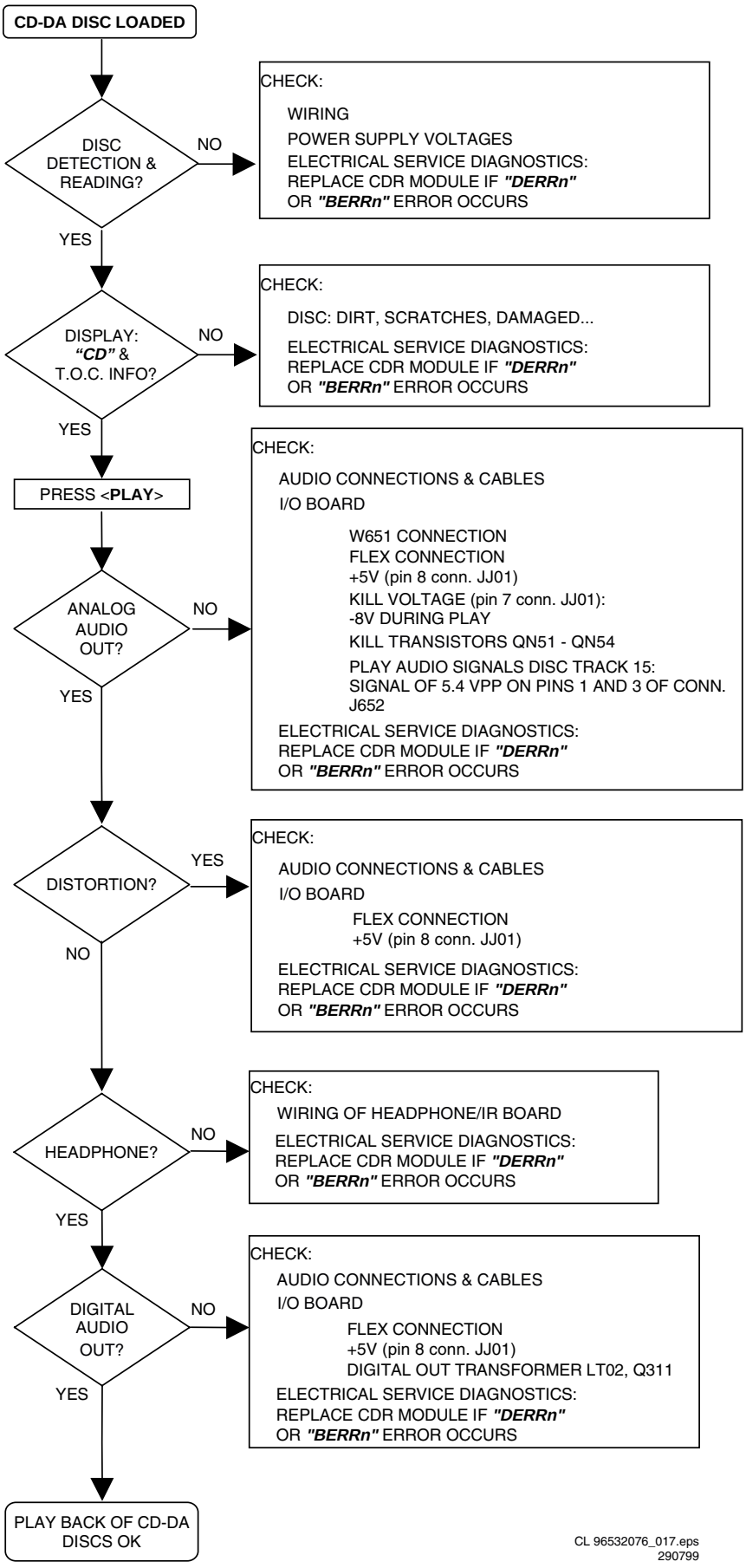

CD-DA DISC LOADED
DISC DETECTION & READING?
NO
CHECK:
WIRING
POWER SUPPLY VOLTAGES
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
DISPLAY: "CD" & T.O.C. INFO?
NO
CHECK:
DISC: DIRT, SCRATCHES, DAMAGED...
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
PRESS <PLAY>
ANALOG AUDIO OUT?
NO
CHECK:
AUDIO CONNECTIONS & CABLES
I/O BOARD
W651 CONNECTION
FLEX CONNECTION
+5V (pin 8 conn. JJ01)
KILL VOLTAGE (pin 7 conn. JJ01):
-8V DURING PLAY
KILL TRANSISTORS QN51 - QN54
PLAY AUDIO SIGNALS DISC TRACK 15:
SIGNAL OF 5.4 VPP ON PINS 1 AND 3 OF CONN. J652
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
DISTORTION?
YES
CHECK:
AUDIO CONNECTIONS & CABLES
I/O BOARD
FLEX CONNECTION
+5V (pin 8 conn. JJ01)
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
NO
HEADPHONE?
NO
CHECK:
WIRING OF HEADPHONE/IR BOARD
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
DIGITAL AUDIO OUT?
NO
CHECK:
AUDIO CONNECTIONS & CABLES
I/O BOARD
FLEX CONNECTION
+5V (pin 8 conn. JJ01)
DIGITAL OUT TRANSFORMER LT02, Q311
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
PLAY BACK OF CD-DA DISCS OK
CL 96532076_017.eps
290799

**Figure 7-2**

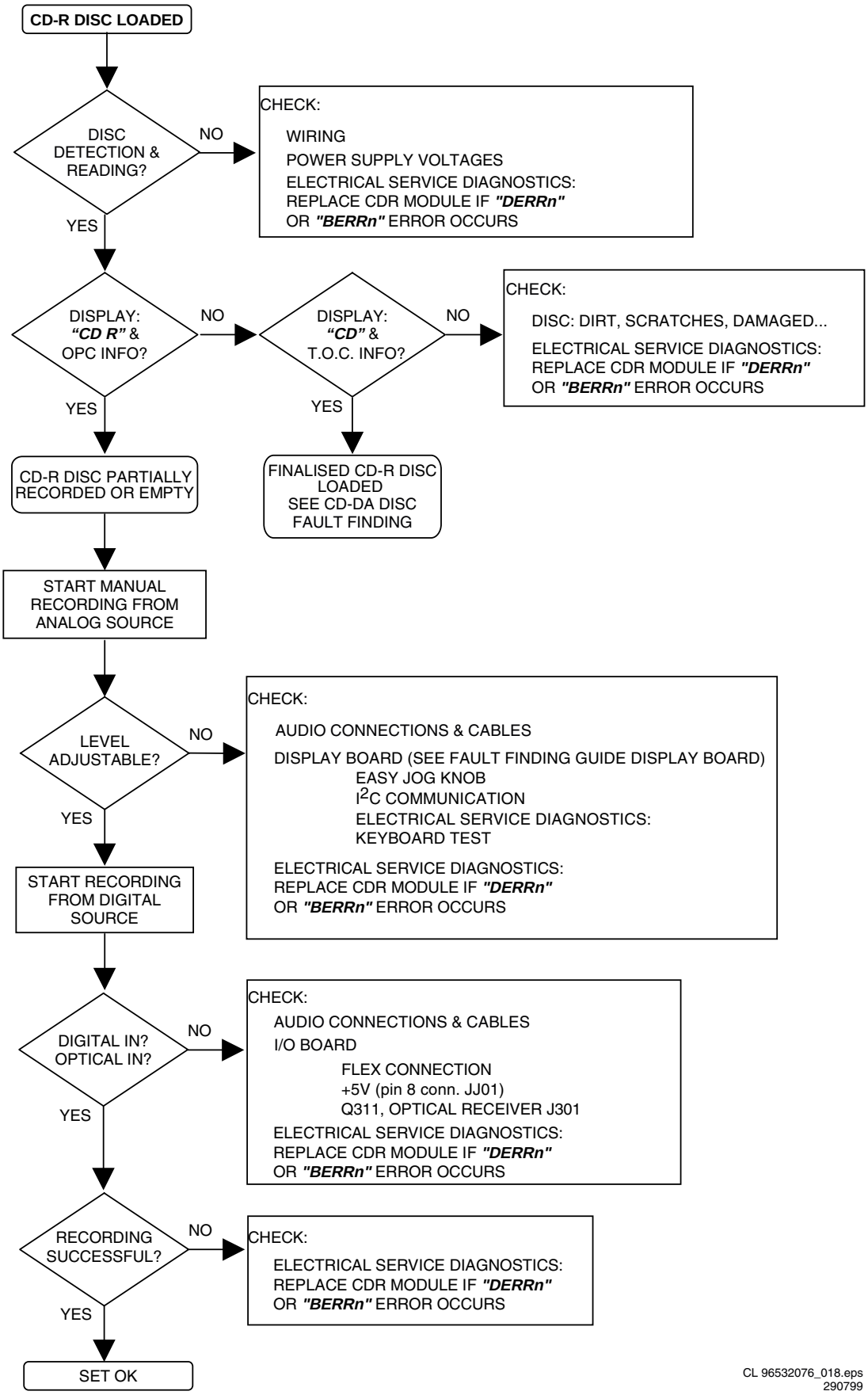

CD-R DISC LOADED
DISC DETECTION & READING?
NO
CHECK:
WIRING
POWER SUPPLY VOLTAGES
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
DISPLAY: "CD R" & OPC INFO?
NO
DISPLAY: "CD" & T.O.C. INFO?
NO
CHECK:
DISC: DIRT, SCRATCHES, DAMAGED...
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
YES
CD-R DISC PARTIALLY RECORDED OR EMPTY
FINALISED CD-R DISC LOADED
SEE CD-DA DISC FAULT FINDING
START MANUAL RECORDING FROM ANALOG SOURCE
LEVEL ADJUSTABLE?
NO
CHECK:
AUDIO CONNECTIONS & CABLES
DISPLAY BOARD (SEE FAULT FINDING GUIDE DISPLAY BOARD)
EASY JOG KNOB
I2C COMMUNICATION
ELECTRICAL SERVICE DIAGNOSTICS:
KEYBOARD TEST
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
START RECORDING FROM DIGITAL SOURCE
DIGITAL IN? OPTICAL IN?
NO
CHECK:
AUDIO CONNECTIONS & CABLES
I/O BOARD
FLEX CONNECTION
+5V (pin 8 conn. JJ01)
Q311, OPTICAL RECEIVER J301
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
RECORDING SUCCESSFUL?
NO
CHECK:
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
SET OK
CL 96532076_018.eps
290799

**Figure 7-3**

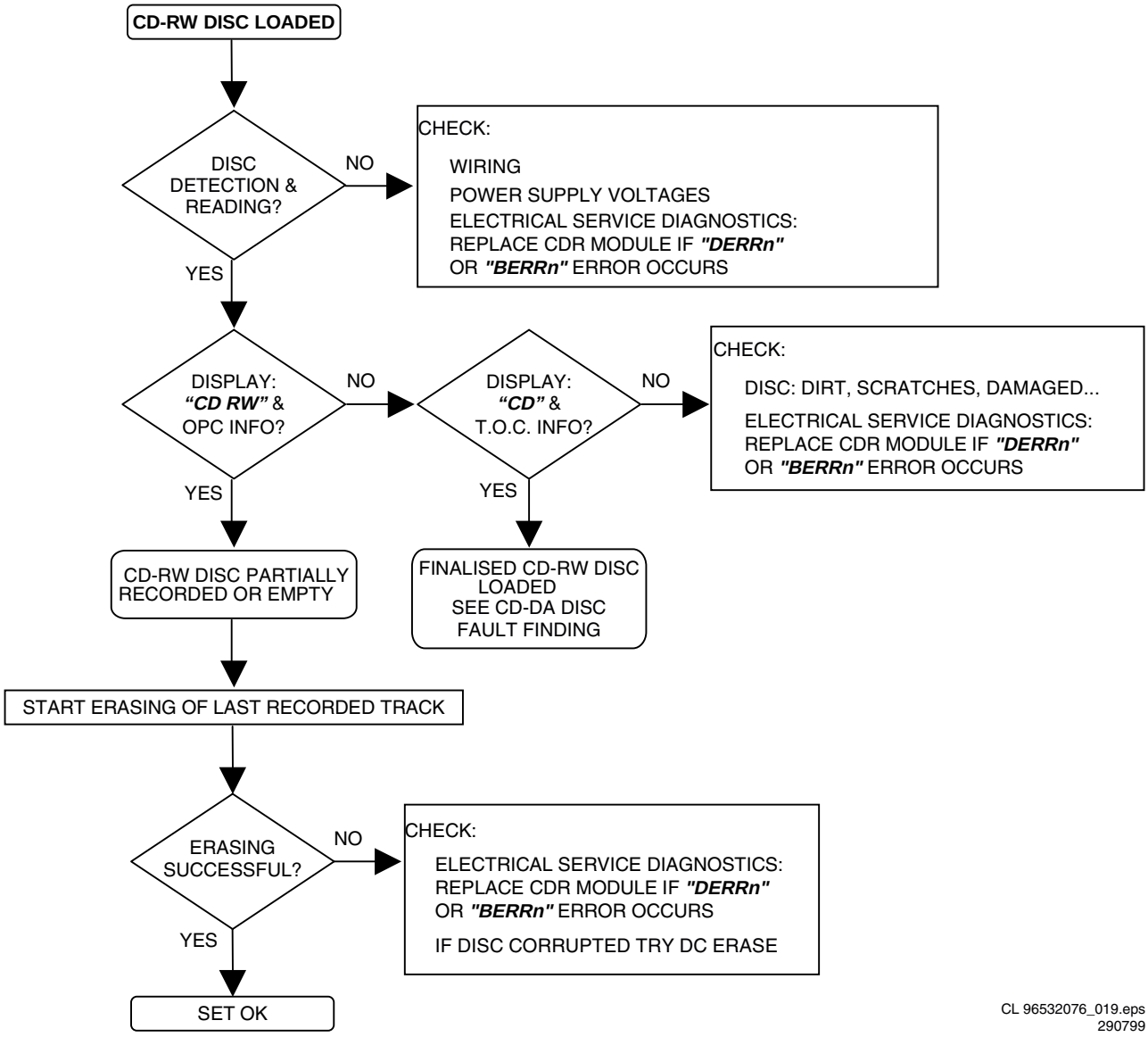

CD-RW DISC LOADED
DISC DETECTION & READING?
NO
CHECK:
WIRING
POWER SUPPLY VOLTAGES
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
DISPLAY: "CD RW" & OPC INFO?
NO
DISPLAY: "CD" & T.O.C. INFO?
NO
CHECK:
DISC: DIRT, SCRATCHES, DAMAGED...
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
YES
YES
CD-RW DISC PARTIALLY RECORDED OR EMPTY
FINALISED CD-RW DISC LOADED
SEE CD-DA DISC FAULT FINDING
START ERASING OF LAST RECORDED TRACK
ERASING SUCCESSFUL?
NO
CHECK:
ELECTRICAL SERVICE DIAGNOSTICS:
REPLACE CDR MODULE IF "DERRn"
OR "BERRn" ERROR OCCURS
IF DISC CORRUPTED TRY DC ERASE
YES
SET OK
CL 96532076_019.eps
290799

**Figure 7-4**

## 7.2 CD Module

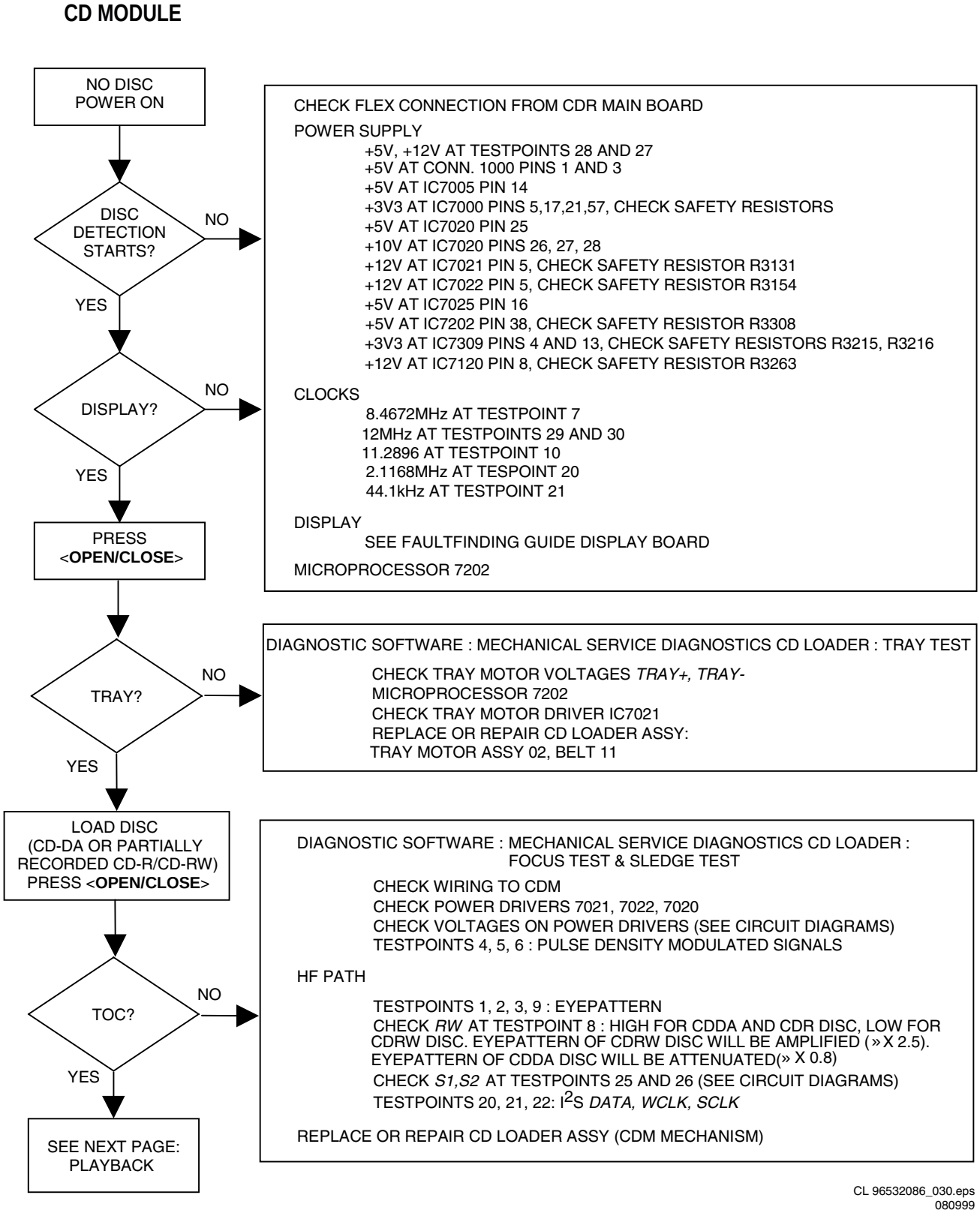

CD MODULE
NO DISC POWER ON
DISC DETECTION STARTS?
NO
YES
DISPLAY?
NO
YES
PRESS <OPEN/CLOSE>
TRAY?
NO
YES
LOAD DISC (CD-DA OR PARTIALLY RECORDED CD-R/CD-RW) PRESS <OPEN/CLOSE>
TOC?
NO
YES
SEE NEXT PAGE: PLAYBACK
CHECK FLEX CONNECTION FROM CDR MAIN BOARD
POWER SUPPLY
+5V, +12V AT TESTPOINTS 28 AND 27
+5V AT CONN. 1000 PINS 1 AND 3
+5V AT IC7005 PIN 14
+3V3 AT IC7000 PINS 5,17,21,57, CHECK SAFETY RESISTORS
+5V AT IC7020 PIN 25
+10V AT IC7020 PINS 26, 27, 28
+12V AT IC7021 PIN 5, CHECK SAFETY RESISTOR R3131
+12V AT IC7022 PIN 5, CHECK SAFETY RESISTOR R3154
+5V AT IC7025 PIN 16
+5V AT IC7202 PIN 38, CHECK SAFETY RESISTOR R3308
+3V3 AT IC7309 PINS 4 AND 13, CHECK SAFETY RESISTORS R3215, R3216
+12V AT IC7120 PIN 8, CHECK SAFETY RESISTOR R3263
CLOCKS
8.4672MHz AT TESTPOINT 7
12MHz AT TESTPOINTS 29 AND 30
11.2896 AT TESTPOINT 10
2.1168MHz AT TESPOINT 20
44.1kHz AT TESTPOINT 21
DISPLAY
SEE FAULTFINDING GUIDE DISPLAY BOARD
MICROPROCESSOR 7202
DIAGNOSTIC SOFTWARE : MECHANICAL SERVICE DIAGNOSTICS CD LOADER : TRAY TEST
CHECK TRAY MOTOR VOLTAGES TRAY+, TRAY-
MICROPROCESSOR 7202
CHECK TRAY MOTOR DRIVER IC7021
REPLACE OR REPAIR CD LOADER ASSY:
TRAY MOTOR ASSY 02, BELT 11
DIAGNOSTIC SOFTWARE : MECHANICAL SERVICE DIAGNOSTICS CD LOADER : FOCUS TEST & SLEDGE TEST
CHECK WIRING TO CDM
CHECK POWER DRIVERS 7021, 7022, 7020
CHECK VOLTAGES ON POWER DRIVERS (SEE CIRCUIT DIAGRAMS)
TESTPOINTS 4, 5, 6 : PULSE DENSITY MODULATED SIGNALS
HF PATH
TESTPOINTS 1, 2, 3, 9 : EYEPATTERN
CHECK RW AT TESTPOINT 8 : HIGH FOR CDDA AND CDR DISC, LOW FOR CDRW DISC. EYEPATTERN OF CDRW DISC WILL BE AMPLIFIED (» X 2.5).
EYEPATTERN OF CDDA DISC WILL BE ATTENUATED(» X 0.8)
CHECK S1,S2 AT TESTPOINTS 25 AND 26 (SEE CIRCUIT DIAGRAMS)
TESTPOINTS 20, 21, 22: I2S DATA, WCLK, SCLK
REPLACE OR REPAIR CD LOADER ASSY (CDM MECHANISM)
CL 96532086_030.eps
080999

**Figure 7-5**

## CD MODULE PLAYBACK

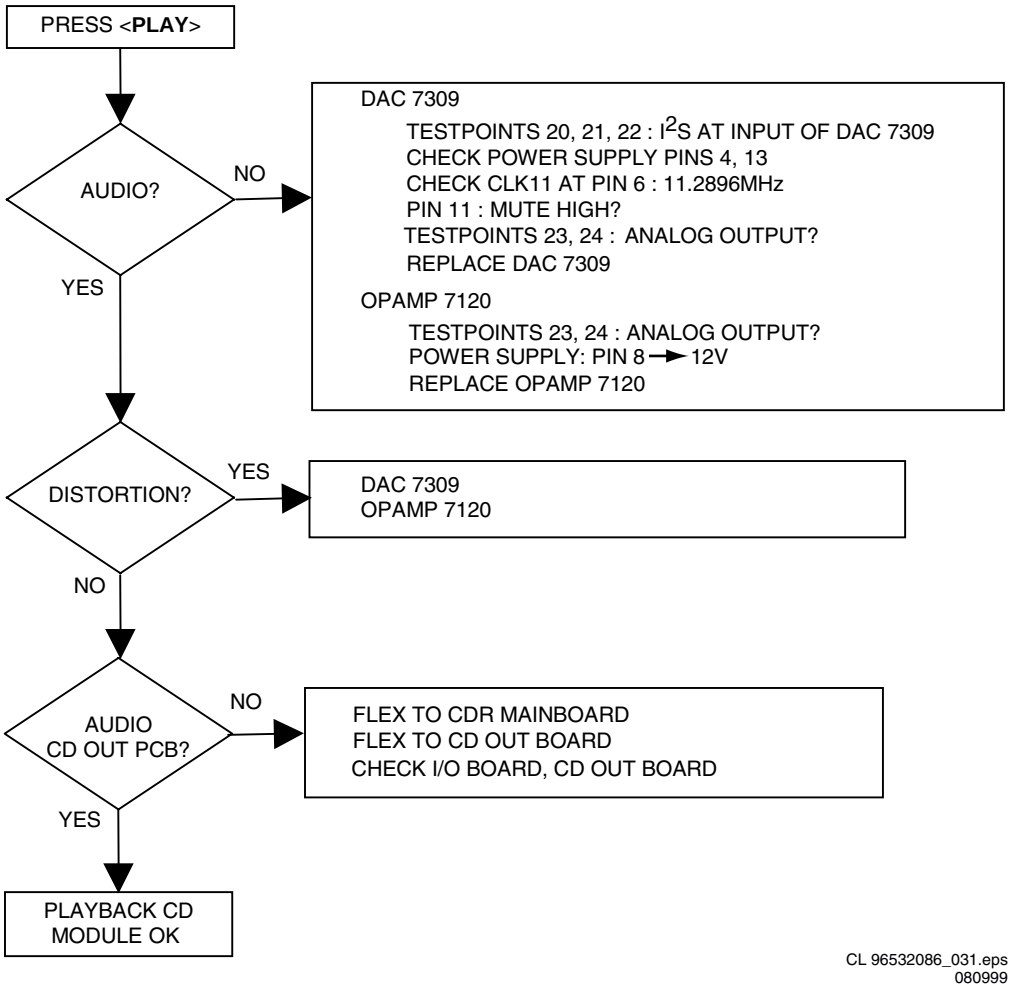



**Figure 7-6**

# 8. Faultfinding Guide

## 8.1 Display Board

### 8.1.1 Description of display board

***General description***

The display board has three major parts : the FTD (Fluorescent Tube Display), the display controller TMP87CH74F and the keyboard. The display controller is controlled by the DASP master processor on the CDR main board. The communication protocol used is I2C. So all the information between DASP and display controller goes via the SDA or I2C DATA and SCL or I2C CLK lines. Communication is always initiated by the DASP on the CDR main board. Unlike the previous generations of CDR players, the interrupt generated by the display controller at key-press or reception of remote control is not used. Instead, the DASP polls the display controller for these events.

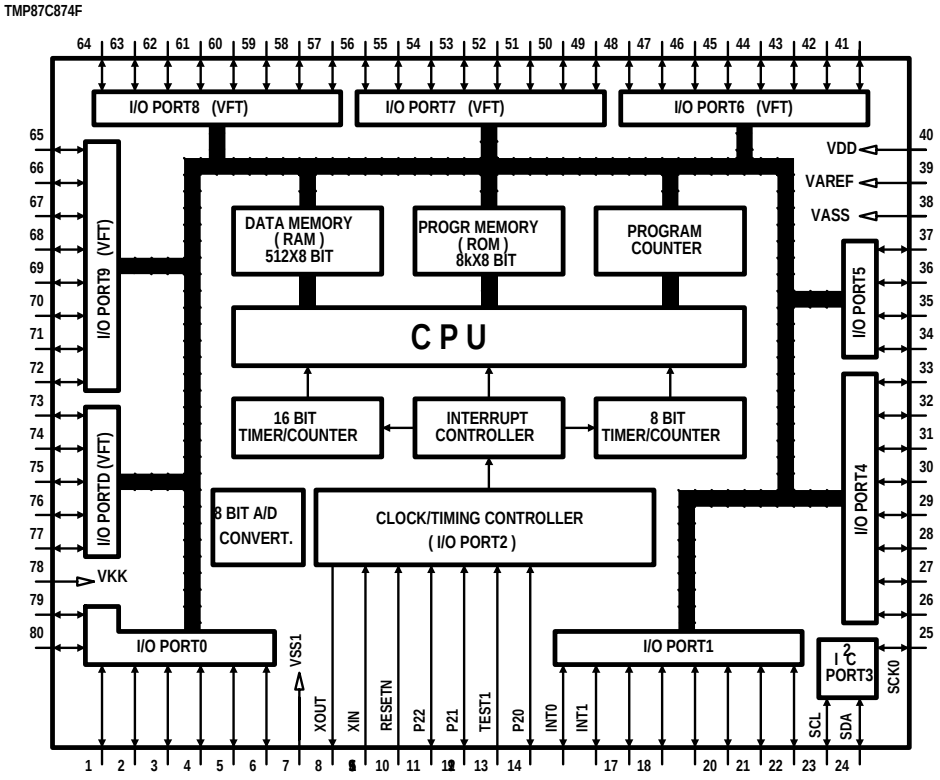
***Display controller TMP87C874F***

TMP87CH74F( QY01) is a high speed and high performance 8-bit single chip microprocessor, containing 8-bit A/D conversion inputs and a VFT (Vacuum Fluorescent Tube) driver. In this application, its functions are :

- slave microprocessor.
- FTD driver.
- generates the square wave for the filament voltage required for an AC FTD.
- generates the grid and segment scanning for the FTD.
- generates the scanning grid for the key matrix.
- input for remote control.

All the communication runs via the serial bus interface I2C. The display controller uses an 8MHz resonator as clock driver.

**BLOCK DIAGRAM**




**PIN DESCRIPTIONS**

| | |
|---|---|
| INT0 | external interrupt input 0 |
| INT1 | external interrupt input 1 |
| RESETN | reset signal input, active low |
| SCL | I2C-bus serial clock input/output |
| SDA | I2C-bus serial data input/output |
| TEST | test pin, tied to low |
| VAREF | analog reference voltage input |
| VASS | analog reference ground |
| VDD | +5V |
| VKK | VFT driver power supply |
| VSS | ground |
| XIN, XOUT | resonator connecting pins for high-frequency clock |

CL 96532076_028.eps
290799

**Figure 8-1**

### 8.1.2 Test instructions

***Supply voltages***

The display board receives several voltages via connector JY01.

- VFTD : -35V ±5% measured at pin 2 of conn. JY01.
- VDC1-VDC2 : 3V8 ±10% measured between pin 1 and 3 of conn. 1119.
- +5V +5V ±5% measured at pin 10 of conn. JY01

Voltages VFTD, VDC1 and VDC2 are produced in the power supply unit and sent to the display board via the CDR main board. The +5V voltage is produced on the CDR main board as D5V.

***Clock signal***

As clock driver for the display controller, a resonator of 8 MHz (XY01)is used. The signal can be measured at pins 8 and 9 of the display controller : 8 MHz ±5%.

***Control signals***

*RESET*

The reset signal comes via pin 4 of conn. JY01 from the DASP master processor on the CDR main board (SYS_RESET). The reset is low active. It should be kept low during power up for at least 3 machine cycles with supply voltage in operating range and a stable clock signal (1 machine cycle = 12 x 1/Fc (8 MHz) sec.). During normal operation, the reset should be high (3V3). The high signal is 3V3 because the DASP operates on 3V3.

*I2C DATA/I2C CLK*

These lines connect to the DASP master processor via respectively pin 5 and pin 7 of conn. JY01. When there is no communication, they should have the high level (+5V). The oscillogram below gives an indication of how these signals should look like.

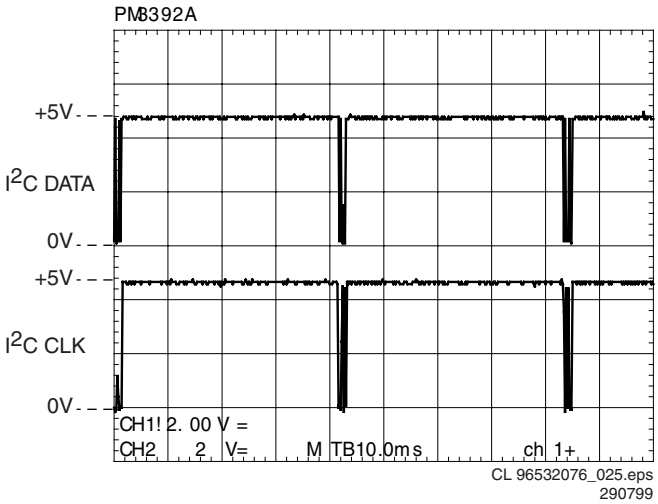



**Figure 8-2 'I2C signals'**

***FTD drive lines***

*Filament voltage*

Should measure 3.8V ±10% (=VDC1-VDC2) between pins 1-3 and pins 1-52 of the FTD(VX01).

*Grid lines*

Level and timing of all grid lines, G1-->G15, can be checked either at the FTD itself or at the display controller. Grid lines G13, G14 and G15 each have an extra current amplifier in line : QY02 for G13, QY03 for G14 and QY04 for G15. A typical grid line signal shows in the oscillogram below.

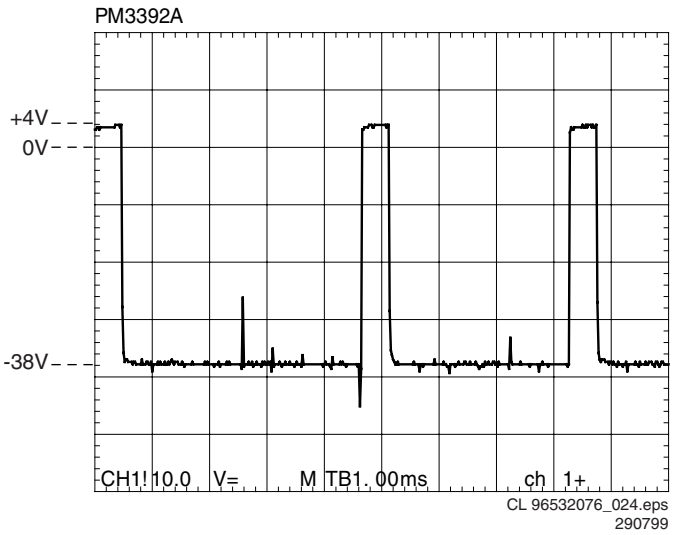



**Figure 8-3 'Gridline'**

*Segment lines*

Level and timing of all segment lines, P1-->P21, can be checked either at the FTD itself or at the display controller. The data on these segment lines however, depends on the characters displayed. The oscillogram below shows a segment line with data. A segment line without data maintains a -38V level.

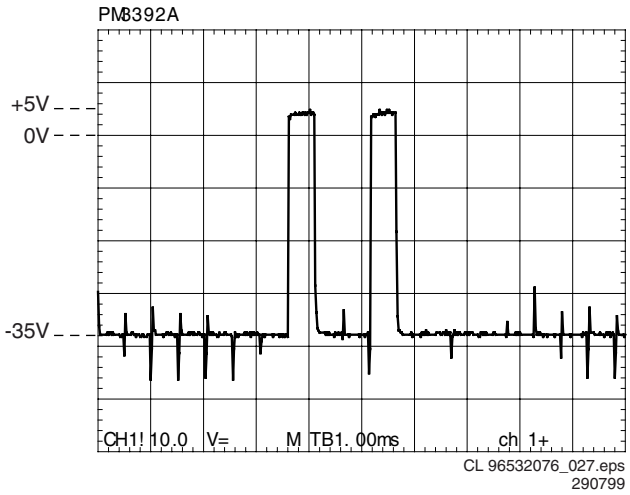



**Figure 8-4 'Segment line'**

***Key matrix lines***

The lines connected to pins 34, 35, 36 and 37 of the display controller act as matrix scanners. Without a key pressed, they maintain a low level. As soon as a key is pressed, the scanning line connected to that key puts out a scanning signal, which should look like the oscillogram below. This scanning signal goes via the pressed key to I/O port 4 of the display controller (pins 28 to 33). The display controller can now determine which key has been pressed. Without a key pressed, pins 28 to 33 of the display controller maintain a high level (+5V).

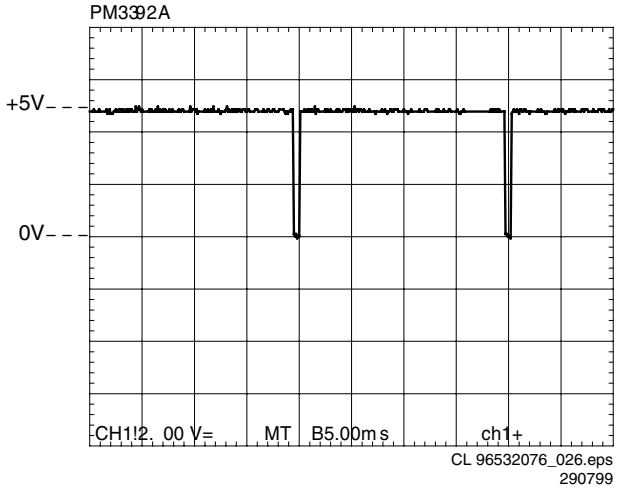



**Figure 8-5 'Key matrix scan line'**

***Easy jog knob***

*Rotary operation*
The easy jog knob (SY26) incorporates a whole heap of user control possibilities in just one knob. Without the knob being operated, pin 1 and 3 of the knob (and thus pin 16 and 17 of the display controller), maintain the +5V level. Turning the knob clockwise briefly connects pin 1 to GND followed by pin 3.

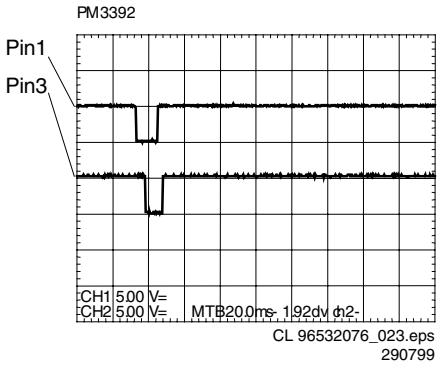



**Figure 8-6 'Turn clockwise'**

Turning the knob anti-clockwise briefly connects pin 3 to GND followed by pin 1.

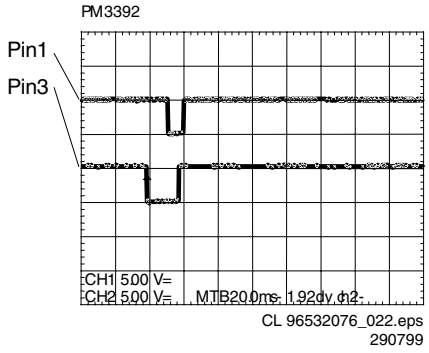



**Figure 8-7 'Turn anti-clockwise'**

The pulses created this way arrive at pin 16 and 17 of the display controller. The first pulse to arrive tells the controller the direction of the rotation. Counting the pulses reveals the amount of rotation. Combining and decoding this information, the display controller will execute the appropriate task.

*Push button operation*
This button connects to the key matrix lines and thus the operation is identical to the ordinary keys. Without being pressed, pin 4 of the easy jog maintains the low level, pin 5 the high level. When pressed the scanning signal goes through the closed contact of pins 4 and 5, and can be checked at both pins.

***IR receiver - remote control***
In the CDR570/930 the IR receiver RPM6934-V4 (ZY01) is mounted on the display board. In all versions the IR receiver connects to the display controller. The signal coming from the receiver can be checked at pin 22 of the display controller. This signal is normally high (+5V). When the remote control is being operated, pulses mixed in with the +5V can be measured. The oscillogram gives an indication of how the signal looks like with the RC being operated.

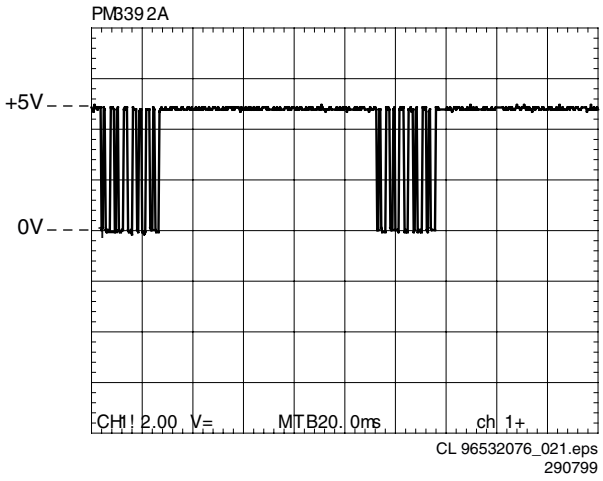



**Figure 8-8 'IR receiver signal'**

### 8.1.3 Display board troubleshooting guide

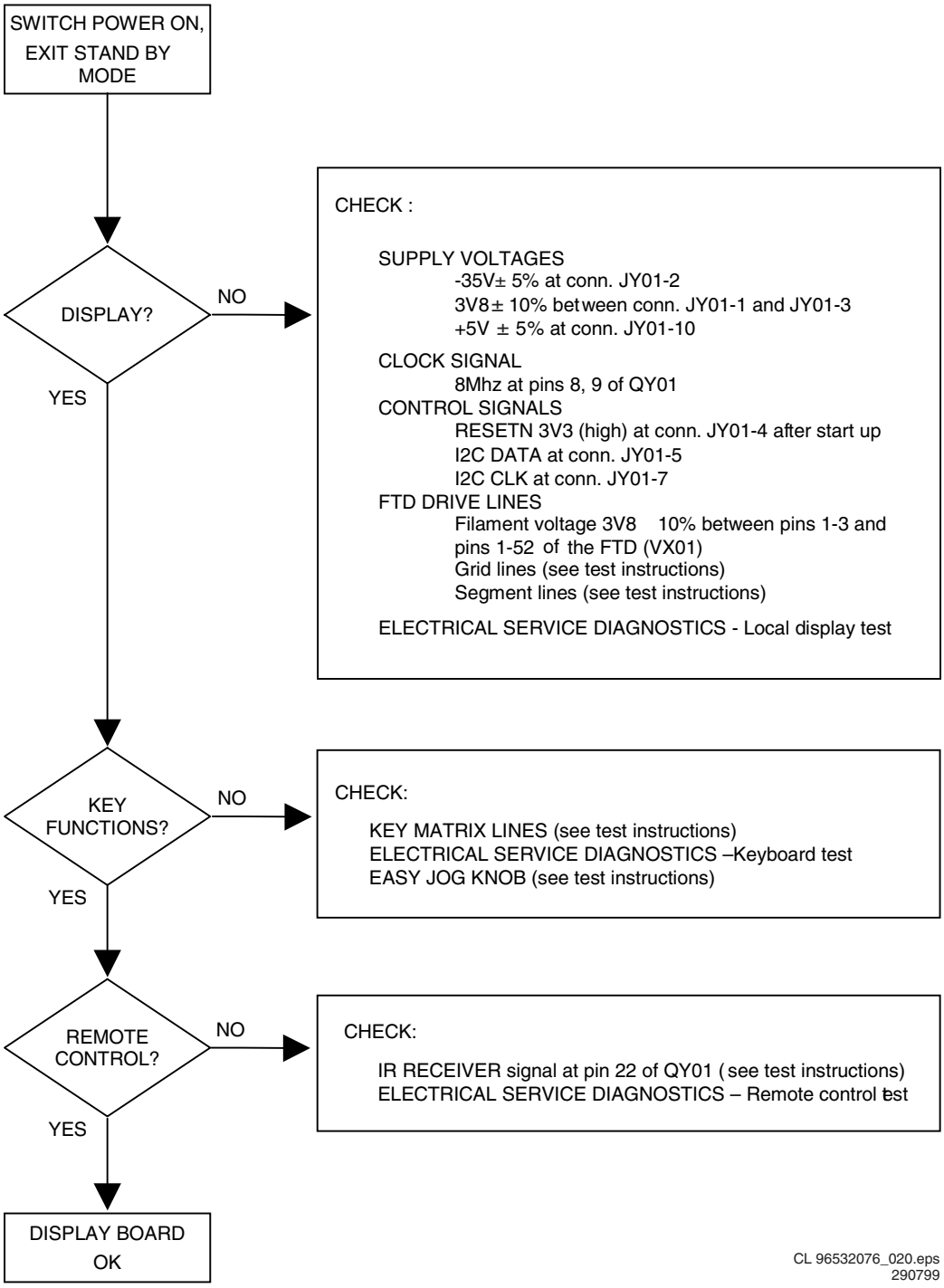



**Figure 8-9 Display board troubleshooting'**

## 8.2 Power Supply Unit P816

### 8.2.1 Description of P816

MOSFET Q825 is used as a power switch controlled by the controller Q810. When the switch is closed, energy is transferred from mains to the transformer. This energy is supplied to the load when the switch is opened. Through control of the switch-on time, the energy transferred in each cycle is regulated so that the output voltages are independent of load or input voltage variations. The controlling device MC44603 is an integrated pulse width modulator. A clock signal initiates power pulses at a fixed frequency. The termination of each output pulse occurs when a feedback signal of the inductor current reaches a threshold set by the error signal. In this way the error signal actually controls the peak inductor current on cycle-by-cycle basis.

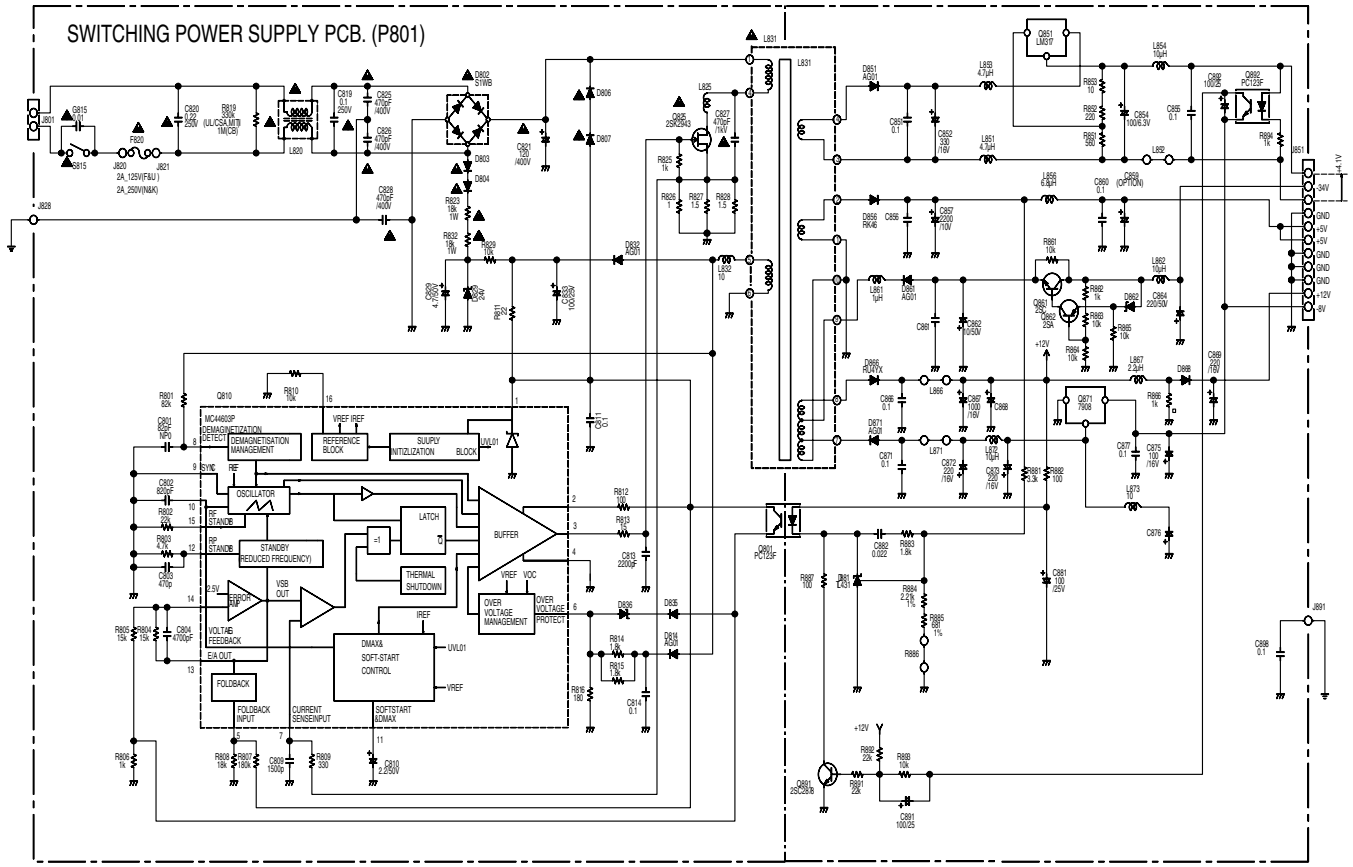



**Figure 8-10 'Blockdiagram P816'**

***Description of controller MC44603***

The MC44603 is an enhanced high performance controller that is specifically designed for off-line and DC-to-DC converter applications. This device has the unique ability of automatically changing operating modes if the converter output is overloaded, unloaded or shorted. The MC44603 has several distinguishing features when compared to conventional SMPS controllers. These features consist of a foldback facility for overload protection, a standby mode when the converter output is slightly loaded, a demagnetization detection for reduced switching stresses on transistor and diodes, and a high current totem pole output ideally suited for driving a power MOSFET. It can also be used for driving a bipolar transistor in low power converters. It is optimised to operate in discontinuous mode but can also operate in continuous mode. Its advanced design allows use in current mode or voltage mode control applications.

*Pin connections*

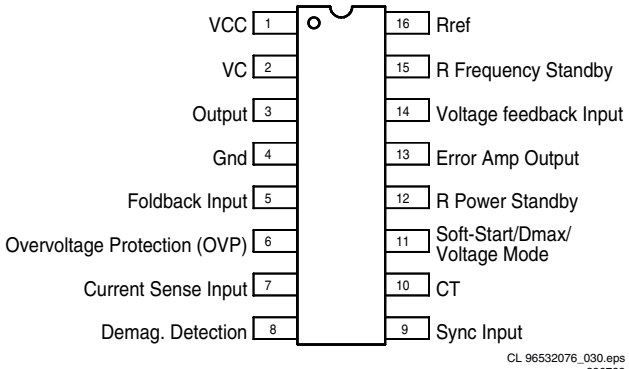



**Figure 8-11**

*Pin function description*

| Pin | Name | Description |
|---|---|---|
| 1 | VCC | This pin is the positive supply of the IC. The operating voltage range after start-up is 9.0 to 14.5 V. |
| 2 | VC | The output high state (VOH) is set by the voltage applied to this pin. |
| 3 | Output | Peak currents up to 750 mA can be sourced or sunk, suitable for driving either MOSFET or bipolar transistors. |
| 4 | Gnd | The groundpin is a single return, typically connected back to the power source. |
| 5 | Foldback Input | The foldback function provides overload protection. |
| 6 | Overvoltage Protection | When the overvoltage protection pin receives a voltage greater than 2.5V, the device is disabled and requires a complete restart sequence. |
| 7 | Current Sense Input | A voltage proportional to the current flowing into the power switch is connected to this input. |
| 8 | Demagnetisation Detection | A voltage delivered by an auxiliary transformer winding provides to the demagnetisation pin an indication of the magnetisation state of the flyback transformer. A zero voltage detection corresponds to complete core saturation. |
| 9 | Synchronisation Input | The synchronisation input pin can be activated with either a negative pulse going from a level between 0.7V and 3.7V to Gnd or a positive pulse going from a level between 0.7V and 3.7V up to a level higher than 3.7V. The oscillator runs free when Pin 9 is connected to Gnd. |
| 10 | $C_T$ | The normal mode oscillator frequency is programmed by the capacitor CT choice together with the Rref resistance value. CT, connected between Pin 10 and Gnd, generates the oscillator sawtooth. |
| 11 | Soft-Start/Dmax/Voltage-Mode | A capacitor, resistor or a voltage source connected to this pin limits the switching duty-cycle. This pin can be used as a voltage mode control input. By connecting Pin 11 to Ground, the MC44603 can be shut down. |
| 12 | RP Standby | A voltage level applied to the RP Standby pin determines the output power level at which the oscillator will turn into the reduced frequency mode of operation (i.e. standby mode). An internal hysteresis comparator allows to return in the normal mode at a higher output power level. |
| 13 | E/A Out | The error amplifier output is made available for loop compensation. |
| 14 | Voltage Feedback | This is the inverting input of the Error Amplifier. It can be connected to the switching power supply output through an optical (or other) feedback loop. |
| 15 | RF Standby | The reduced frequency or standby frequency programming is made by the RF Standby resistance choice. |
| 16 | Rref | Rref sets the internal reference current. The internal reference current ranges from 100 A to 500 A. This requires that 5.0kW £ Rref £ 25kW. |

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**Figure 8-12**

*Block diagram of MC44603*

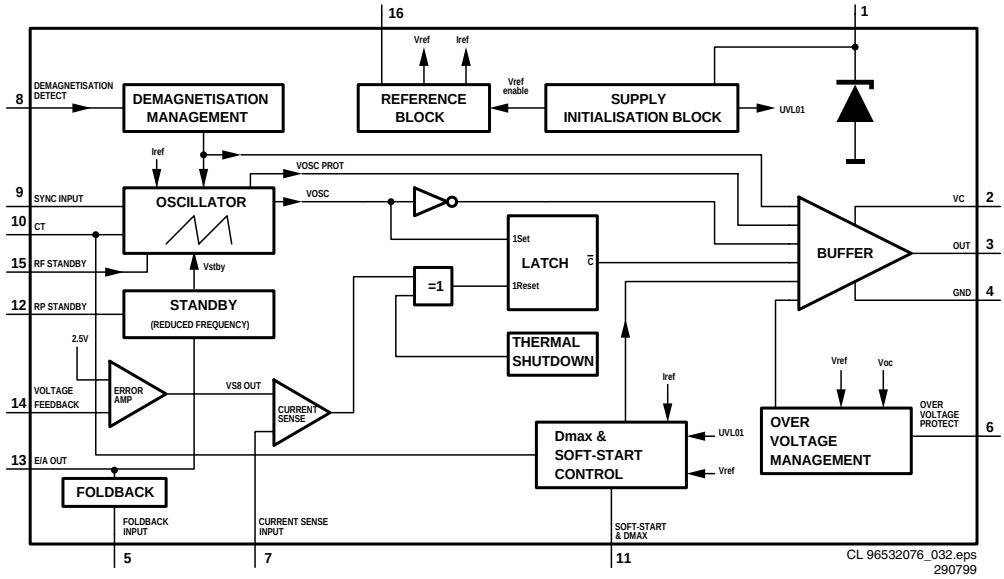



**Figure 8-13**

*Operating description of MC44603*

The input voltage Vcc (pin 1) is monitored by a comparator with hysteresis, enabling the circuit at 14.5V and disabling the circuit below 7.5V. The error amplifier compares a voltage Vfb (pin 14) related to the output voltage of the power supply, with an internal 2.5V reference. The current sense comparator compares the output of the error amplifier with the switch current Isense (pin 7) of the power supply. The output of the current sense comparator resets a latch, which is set every cycle by the oscillator. The output stage is a totem pole, capable of driving a MOSFET directly.

***Start up sequence of P816***

t1: Charging the capacitors at Vcc
C829 will be charged via R823 and R832, C833 and C811 via R829. The output is switched off during t1.
t2: Charging of output capacitors
When the input voltage of the IC exceeds 14.5V, the circuit is enabled and starts to produce output pulses. The current consumption of the circuit increases to about 17mA, depending on the external loads of the IC. At first, the capacitors at the Vcc pin will discharge because the primary auxiliary voltage, coming from winding 7-9 is below the Vcc voltage. At some moment during t2, the primary auxiliary voltage reaches the same level as Vcc. This primary auxiliary voltage now determines the Vcc voltage.
t3: Regulation
The output voltage of the power supply is in regulation.
t4: Overload
When the output is shorted, the supply voltage of the circuit will decrease and after some time drop below the lower threshold voltage. At that moment, the output will be disabled and the process of charging the Vcc capacitors starts again. If the output is still shorted at the next t2 phase, the complete start- and stop sequence will repeat. The power supply goes in a hiccup mode.

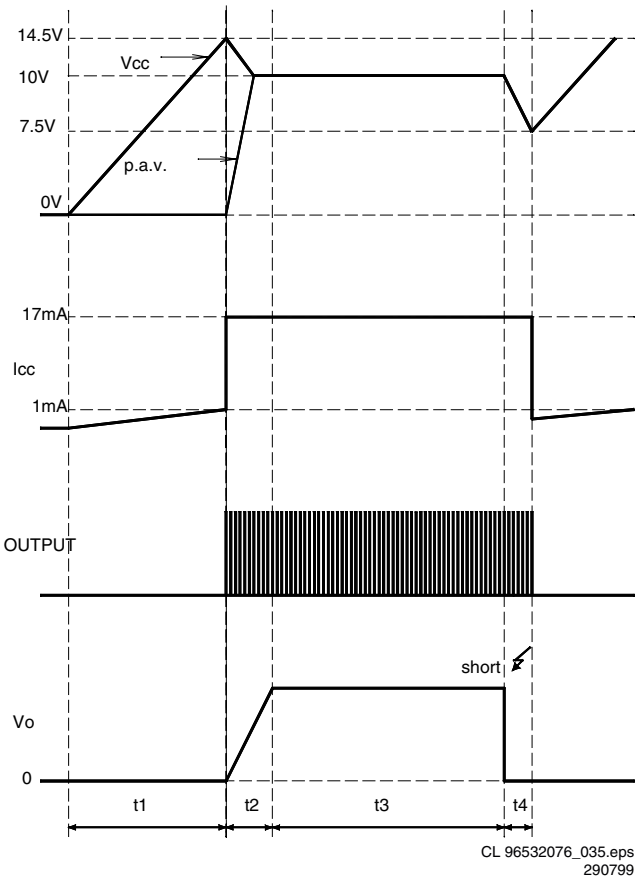



**Figure 8-14 'Start-up sequence'**

***Regulation of P816***

Figure 8-14 shows the most relevant signals during the regulation phase of the power supply.
The oscillator voltage ramps up and down between V1 and V2. The voltage at the current sense terminal is compared every cycle with the output of the error amplifier Vcomp. The output

is switched off when the current sense level exceeds the level at the output of the error amplifier.
TimeON phase : A drain current will flow from the positive supply at pin 2 of the transformer through the transformer's primary winding, the MOSFET and Rsense to ground. As the positive voltage at pin 2 of the transformer is constant, the current will increase linearly and create a ramp dependent on the mains voltage and the inductance of the primary winding. A certain amount of energy is stored in the transformer in the form of a magnetic field. The polarity of the voltages at the secondary windings is opposite to the primary winding so that the diodes are non-conducting in this phase.
TimeDIODE phase : When the MOSFET is switched off, energy is no longer supplied to the transformer. The inductance of the tranformer now tries to maintain the current which has been flowing through it at a constant level. The polarity of the voltage from the transformer therefore reverses. This results in a current flow through the transformer's secondary winding via the now conducting diodes, electrolytic capacitors and the load. This current is also ramp shaped but decreasing.
TimeDEAD phase : when the stored energy has been supplied to the load, the current in the secondary windings stops flowing. At this point, the drain voltage of the MOSFET will drop to the voltage of C821 with a ringing caused by the drain-source capacitance with the primary inductance.
The oscillator will start a next cycle which consists of the above described three phases. The time of the different phases depends on the mains voltage and the load.
TimeDEAD is maximum with an input of 400VDC and a minimum load. It will be zero with an input of 100VDC and an overload.

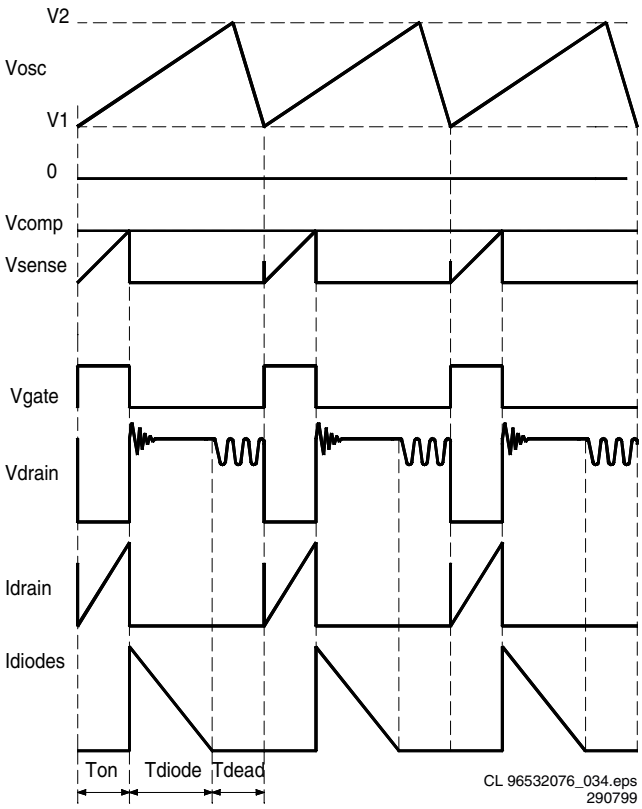
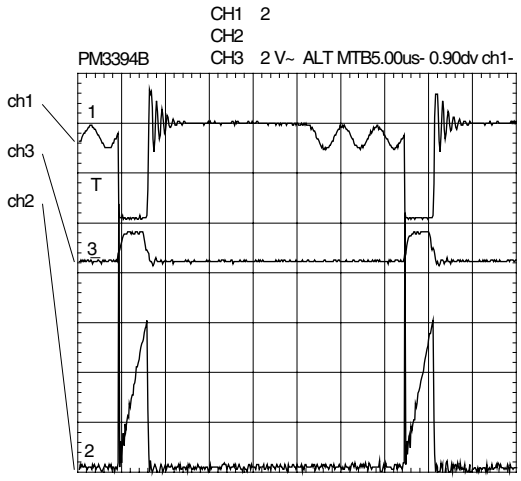
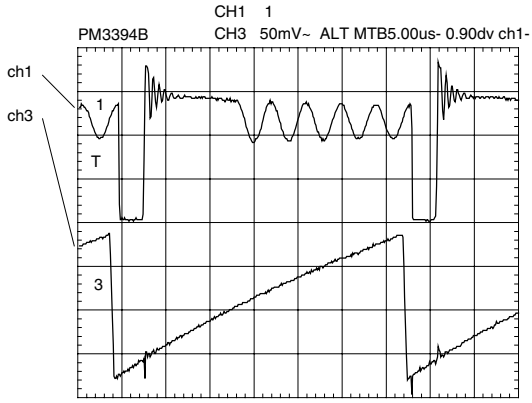


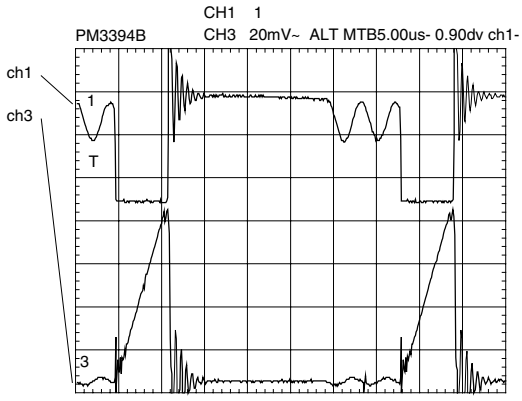

**Figure 8-15 'Regulation'**




ch1 : Drain voltage
ch2 : Drain current
ch3 : Gate voltage




ch1 : Drain voltage
ch2 : Oscillator voltage




ch1 : Drain voltage
ch3 : Sense voltage

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**Figure 8-16 'Oscillograms'**

***Circuit description of P816***

*Input circuit*
The input circuit consists of a lightning protection circuit and an EMI filter.
The lightning protection comprises R819.
The EMI filter is formed by C820, L820, C825 and C826.
It prevents inflow of noise into the mains.

*Primary rectifier/smoothing*
The AC input is rectified by rectifier bridge D802 and smoothed into C821. The voltage over C821 is approximately 300V.
It can vary from 100V to 390V.

*Start up circuit and Vcc supply*
This circuit is formed by R823, R834, C829, D828, R829, R811,C833 and C811.
When the power plug is connected to the mains voltage, the stabilised voltage over D829 (24V ) will charge C833 via R829.When the voltage reaches 14.5V across C811, the control circuit of Q810 is turned on and the regulation starts.
During regulation, Vcc of IC7110 will be supplied by the rectified voltage from winding 7-9 via L832, D832 and C833.

*Control circuit*
The control circuit exists of Q810, C802, C804, C807, C809, C810, R802, R803, R804, R807, R808, R809 and R810.
C802 and R810 define the frequency of the oscillator.

*Power switch circuit*
This circuit comprises MOSFET Q825, Rsense R826, R827 and R828, R825, C827, L825, R812 and R813. R825 is a pull-down resistor to remove static charges from the gate of the MOSFET.

*Regulation circuit*
The regulation circuit comprises opto-coupler Q801which isolates the error signal from the control IC on the primary side and a reference component D881. The TL431(D881) can be represented by two components:
a very stable and accurate reference diode
a high gain amplifier

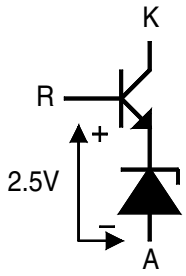

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**Figure 8-17 'TL 431'**

TL431 will conduct from cathode to anode when the reference is higher than the internal reference voltage of about 2.5V. If the reference voltage is lower, the cathode current is almost zero. The cathode current flows through the LED of the opto-coupler. The collector current of the opto-coupler flows through R806, producing an error voltage, connected to voltage feedback pin 14 of Q810.

*Demagnetisation*
The auxiliary winding (7-9) voltage is used to detect magnetic saturation of the transformer core and connected via R801 to pin 8 of Q810. During the demagnetisation phase, the output will be disabled.

*Overvoltage protection circuit*
This circuit consist of D814, C814, R814, R815 and R816.
When the regulation circuit is interrupted due to an error in the control loop, the regulated output voltage will increase (overvoltage). This overvoltage is sensed at the auxiliary winding 7-9.
When an overvoltage longer than 2.0 (s is detected, the output is disabled until VCC is removed and then re-applied. The power supply will come in a hiccup mode as long as the error in the control loop is present.

*Secondary rectifier/smoothing circuit*
There are 5 rectifier/smoothing circuits on the secondary side. Each voltage depends on the number of windings of the transformer.
The -8V supply is regulated by voltage regulator Q871.

*On/off circuit*

### 8.2.2 Troubleshooting P816

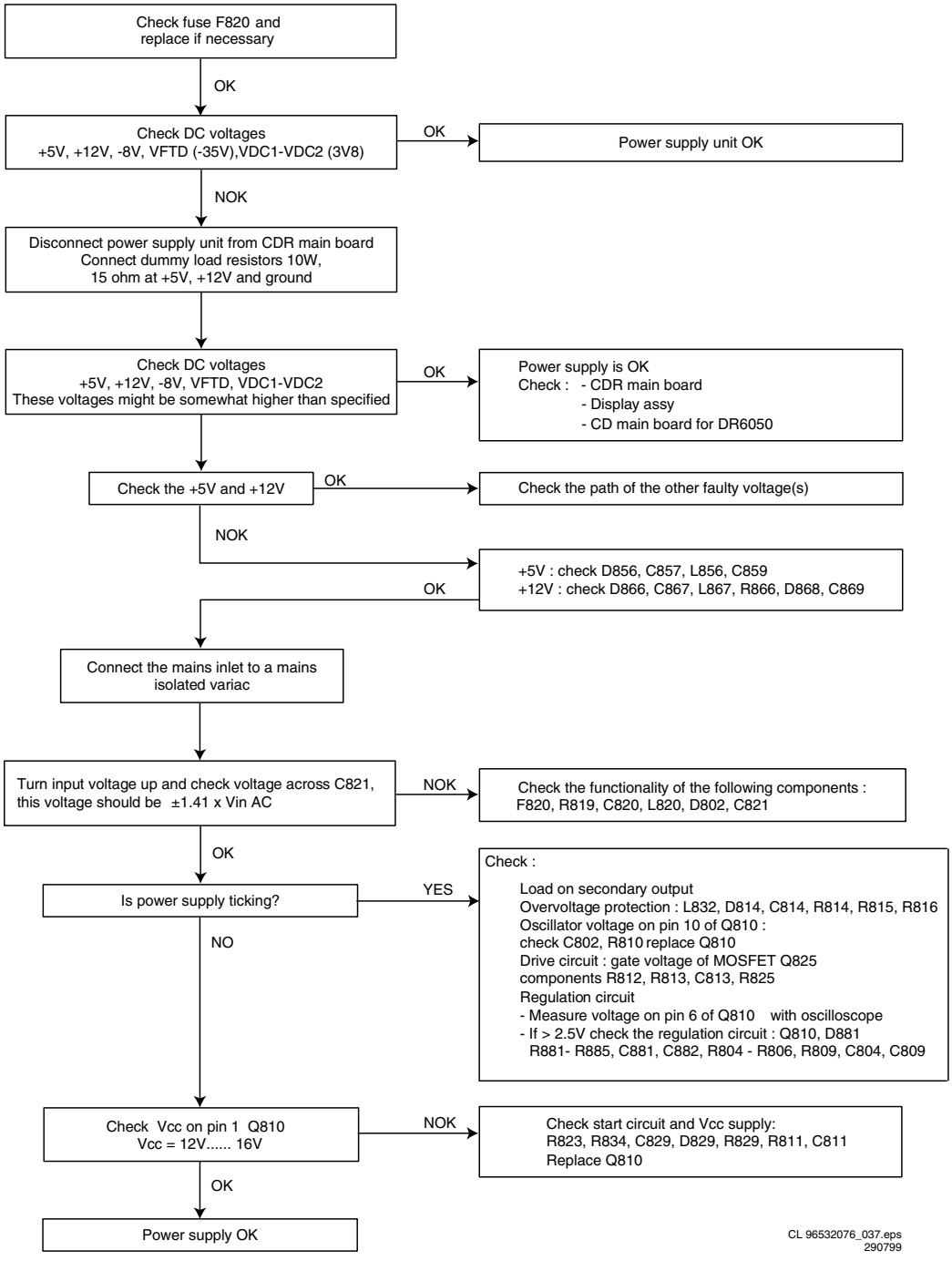
Check fuse F820 and replace if necessary
OK
Check DC voltages +5V, +12V, -8V, VFTD (-35V),VDC1-VDC2 (3V8)
OK
Power supply unit OK
NOK
Disconnect power supply unit from CDR main board
Connect dummy load resistors 10W, 15 ohm at +5V, +12V and ground
Check DC voltages +5V, +12V, -8V, VFTD, VDC1-VDC2 These voltages might be somewhat higher than specified
OK
Power supply is OK
Check : - CDR main board
- Display assy
- CD main board for DR6050
Check the +5V and +12V
OK
Check the path of the other faulty voltage(s)
NOK
+5V : check D856, C857, L856, C859
+12V : check D866, C867, L867, R866, D868, C869
OK
Connect the mains inlet to a mains isolated variac
Turn input voltage up and check voltage across C821, this voltage should be ±1.41 x Vin AC
NOK
Check the functionality of the following components : F820, R819, C820, L820, D802, C821
OK
Is power supply ticking?
YES
Check :
Load on secondary output
Overvoltage protection : L832, D814, C814, R814, R815, R816
Oscillator voltage on pin 10 of Q810 :
check C802, R810 replace Q810
Drive circuit : gate voltage of MOSFET Q825
components R812, R813, C813, R825
Regulation circuit
- Measure voltage on pin 6 of Q810 with oscilloscope
- If > 2.5V check the regulation circuit : Q810, D881
R881- R885, C881, C882, R804 - R806, R809, C804, C809
NO
Check Vcc on pin 1 Q810
Vcc = 12V..... 16V
NOK
Check start circuit and Vcc supply:
R823, R834, C829, D829, R829, R811, C811
Replace Q810
OK
Power supply OK
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**Figure 8-18**

## 8.3 CD Main Board

The CD main board is built around the compact disc mechanism VAM1250 and a loader 1250. The CDM delivers diode signals and an unequalised high frequency signal. These signals are necessary inputs for the decoder CD10. Based on these signals the decoder will control the disc. The decoder is able to control the sledge, focus motor, radial motor and turn table. When everything is "locked", the decoder delivers a digital output according to IEC958 standard, subcode to the microprocessor and I2S for reproducing analog audio signals by means of a D/A converter.

The microprocessor controls the CD10 and is slave of the master processor on the CDR main board in the DR6050. Both processors communicate via a DSA connection (data, strobe and acknowledge).

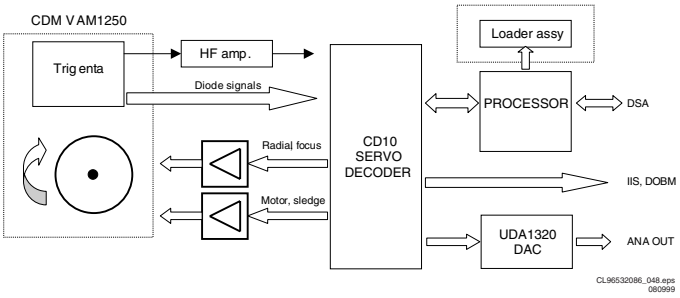


**Figure 8-19**

### 8.3.1 Supply Voltages

***Description***

The CD main board receives +5V and +12V from the CDR main board via respectively pin 16 and pin 15 of connector 1208. The +5V is split up into +5VHF and +5V. The +5VHF is used mainly for the diode currents and the HF-amplifier. The +5V is used for the digital part of the board. On the board a +3V3 is made from the +5V for the decoder CD10 and an A3V3 for the DAC UDA1320. The +12V is split up into A12V for the audio output stage and +12V for the power drivers of the CDM.

***Measurements***

Connect following supplies to next pins :

+5V + 5% to pin 16 of connector 1208.
+12V + 5% to pin 15 of connector 1208.
Ground reference to pin 17 of connector 1208.

Keep microprocessor 7202 in reset by forcing pin 7 of connector 1208 to +5V. Check the following voltages :

| Point | Voltage |
|---|---|
| Position 1000 pins 1,3 | +5V ± 5% |
| Position 7000 pins 5,17,21,57 | +3.3V ± 5% |
| Position 7005 pin 14 | +5V ± 5% |
| Position 7020 pins 25 | +5V ± 5% |
| Position 7020 pins 26,27,28 | +10 ±10% |
| Position 7021 pin 5 | +12V ±10 |
| Position 7022 pin 5 | +12V ±10 |
| Position 7025 pin 16 | +5V ± 5% |
| Position 7202 pin 38 | +5V ± 5% ( other appl. 3V3 possible) |
| Position 7309 pins 4,13 | +3V3 ± 5% |
| Position 7120 pin 8 | +12V ± 10 |

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**Figure 8-20**

### 8.3.2 Clock Signals

***Description***

The microprocessor has its own Xtal or resonator of 12MHz. The CD10 needs a clock of 8.4672MHz + 100ppm. This speed also relates to the disc speed. To avoid locking problems between the two drives in the CDR775, both drives run on the same clock. Therefore the CD main board gets the clock for the decoder from the CDR main board via pin 2 of connector 1208. The DAC needs a system clock to drive its internal digital filters and to clock the I2S signals from the decoder. In our case this is 11.2896MHz (CL11) generated by the CD10.

***Measurements***

Connect the power supply as described above in "1.1.1. Supply Voltages".

Connect on pin 2 of position 1208 a clock signal of 8.4672 MHz ( 100ppm minimum rise time of 50ns and at TTL level (0V and +5V).
Keep microprocessor 7202 in reset by forcing pin 7 at position 1208 to +5V.
Release the reset. Now, the processor will reset the CD10 for at least 75 µs.
The output clock CL11 should be available now at pin 42 of the CD10.

Check the following frequencies :

| Point | Frequency |
|---|---|
| Position 7000 pin 16 | 8.4672 MHz ±100ppm |
| Position 7202 pins 14,15 | 12MHz ±5% |
| Position 7309 pin 6 | 11.2896 MHz ±100ppm |
| Position 7309 pin 1 | 2.1168 MHz ±100ppm |
| Position 7309 pin2 | 44.1kHz ±100ppm |

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**Figure 8-21**

### 8.3.3 CD10 Decoder/Servo SAA7324 (7000)

***Description***

The CD10 is a single chip combining the functions of a CD decoder, digital servo and bitstream DAC. The decoder/servo part is based on the CD7. The decoding part supports a full audio specification and can operate at single speed (n=1) and double speed (n=2).

***Block Diagram***

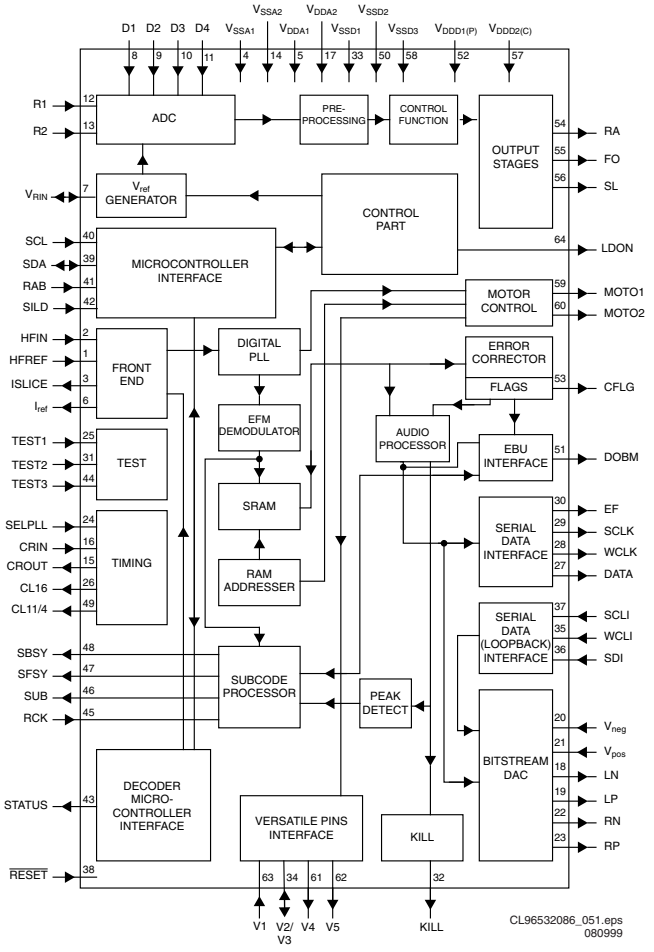


**Figure 8-22**

***Pin Configuration***

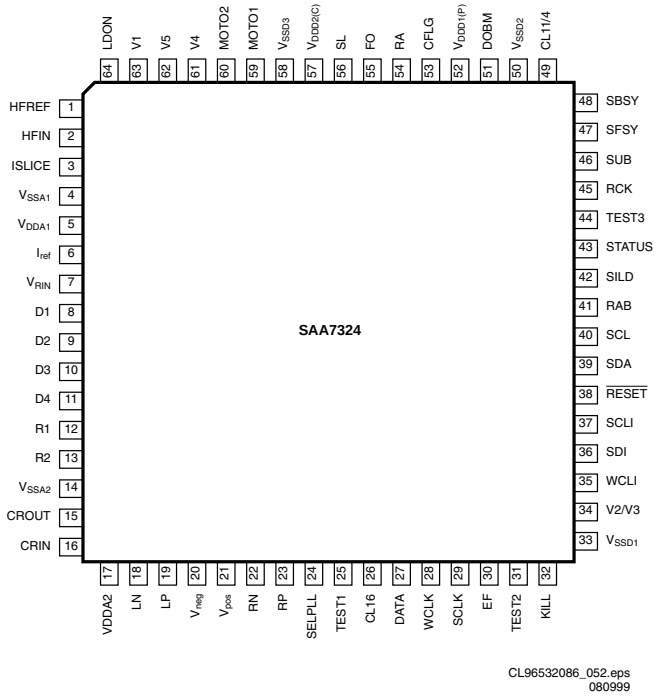


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**Figure 8-23**

### 8.3.4 TDA7073A Power Drivers (7021, 7022)

***Description***

The TDA7073A is a dual power driver circuit for servo systems with a single supply. In this configuration it is used to drive the sledge, tray, focus and radial.

***Measurements***

Keep microprocessor 7202 in reset by forcing pin 7 of connector 1208 to +5V. Connect the power supply as described above in "1.1.1. Supply Voltages". Check the following voltages :

| Pin | Location | Value |
|---|---|---|
| 5 | 7021 | 12V ± 10% |
| 5 | 7022 | 12V ± 10% |
| 1 | 7022 | 1.65V ± 10% |
| 2 | 7022 | 1.65V ± 10% |
| 6 | 7022 | 1.65V ± 10% |
| 7 | 7022 | 1.65V ± 10% |
| 1 | 7021 | 5.0 ± 10% |
| 2 | 7021 | 5.0 ± 10% |
| 6 | 7021 | 1.65V ± 10% |
| 7 | 7021 | 1.65V ± 10% |

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**Figure 8-24**

| Pin | Location | | Value DC |
|---|---|---|---|
| 9 | 7022 | FOC | 5.8V ± 10% |
| 12 | 7022 | FOC | 5.8V |
| 13 | 7022 | RAD | 5.8V |
| 16 | 7022 | RAD | 5.8V |
| 9 | 7021 | SLE | 5.8V |
| 12 | 7021 | SLE | 5.8V |
| 13 | 7021 | TRAY- | 5.8V |
| 16 | 7021 | TRAY+ | 5.8V |

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**Figure 8-25**

### 8.3.5 BA6856FP Turn Table Motor Driver (7020)

***Description***

This component is a 3 phase, full wave pseudo linear driving system with inbuilt Hall Bias circuit and 3 phase parallel output.

***Measurements***

Keep processor 7202 in reset by forcing pin 7 of connector 1208 to +5V. The outputs 9, 10, 11 of connector 1006 are 0V.
Pin 21 of the motor driver 7020 is 2.5V ±10%.
Pin 22 of the motor driver 7020 is 2.5V ±10%.
Pin 23 of the motor driver 7020 is 0V.
Pin 19 of the motor driver 7020 is 5V ±10%.
Put the processor out of reset to continue the measurement. Check MOT1 at pin 59 of CD10. The duty cycle of the output should be 50%. Check wave form at pin 11 of 7005-D : amplitude 5V + 5% duty cycle 50%.
The motor driver 7020 can be measured dynamically by connecting a hall motor to the application panel. Apply a pulse of 1V 10Hz and 15% duty cycle to pin 22 (Ec) as input value with reference to pin 21 (Ecr=2.5V). Measure the output signals on the driver. This will give as response a square wave on pin 17 and pin 18. When a positive voltage is applied, the square wave on pin 17 will go ahead of the square wave on pin 18. All signals will have a value as shown in the truth table. Check the following output signals :

## Motor controller truth table

| Input conditions conn 1006 pin | | | | | | Outputs conn 1006 | | | Test points on driver | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 8 | 4 | 7 | 3 | 2 | 9 | 10 | 11 | 18 | 17 | 16 |
| U+ | U- | V+ | V- | W+ | W- | UCOIL | VCOIL | WCOIL | HALL_U | HALL_V | HALL_W |
| L | M | H | M | M | M | 6V | 0V | 0V | 0V | 5V | |
| H | M | L | M | M | M | 0V | 6V | 6V | 5V | 0V | |
| M | M | L | M | H | M | 0V | 6V | 0V | | 0V | 5V |
| M | M | H | M | L | M | 6V | 0V | 6V | | 5V | 0V |
| H | M | M | M | L | M | 0V | 0V | 6V | 5V | | 0V |
| L | M | M | M | H | M | 6V | 6V | 0V | 0V | | 5V |

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**Figure 8-26**

## Hall-elements input signal voltage levels

| Input voltage | Level | Tolerance | Unit |
|---|---|---|---|
| H | 2.8 | 0.1 | V |
| M | 2.5 | 0.1 | V |
| L | 2.2 | 0.1 | V |

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**Figure 8-27**

### 8.3.6 Tray Control

***Description***

The tray control consists of a TDA7073A power driver (7021) controlled by the processor 7202 via pin 19 TRAYIN and pin 20 TRAYOUT. If pin 20 is low and pin 19 high, the TRAY+ signal at pin 16 of 7021 is forced to +8V and the TRAY- signal at pin 13 of 7021 to GND : the tray will open. If pin 20 is high and pin 19 low, TRAY+ becomes GND and TRAY- becomes +8V : the tray will close. If pin 19 and 20 of the processor have the same value, TRAY+ and TRAY- will have the same value as well : the tray stops moving.

***Measurements***

Keep procesor 7202 in reset by forcing pin 7 of connector 1208 to +5V. Connect a load of 15 , 7W between pin 3 and 4 of connector 1002. Check the voltage over the load with TRAY+ (pin 3) as positive reference. Check also the levels of pins 19 and 20 of the processor.
U TRAY+,TRAY- = <100mV
Pin 20 = +5V
Pin 19 = +5V
Force pin 20 of the processor to ground, and check the voltages.
U TRAY+,TRAY- = -6.5V( 10%
Pin 20 = +0V
Pin 19 = +5V
Force pin 19 of the processor to ground as well and check the levels again.
U TRAY+,TRAY- = <100mV
Pin 20 = +0V
Pin 19 = +0V
Release pin 20 of the processor and check the levels.
U TRAY+,TRAY- = 6.5V( 10%
Pin 20 = +5V
Pin 19 = +0V
Release pin 19 of the processor and check the levels again:
U TRAY+,TRAY- = <100mV
Pin 20 = +5V
Pin 19 = +5V

### 8.3.7 HF Path

***Description***

The pre-amplified HF-signal is presented to both n=1 and n=2 amplifier circuits. The mux/demux switches via software and micro processor controlled S1 and S2 lines between either one of the amplified n=1 or n=2 signals. The signal will then follow another amplification and filtering circuit. The filtering again is controlled by the S1 and S2 lines, dependant on whether the disc starts up (speed n=1, S1 and S2 Low), disc plays at speed n=1 (S1 Low, S2 High) or disc plays at speed n=2 (S1 and S2 High).

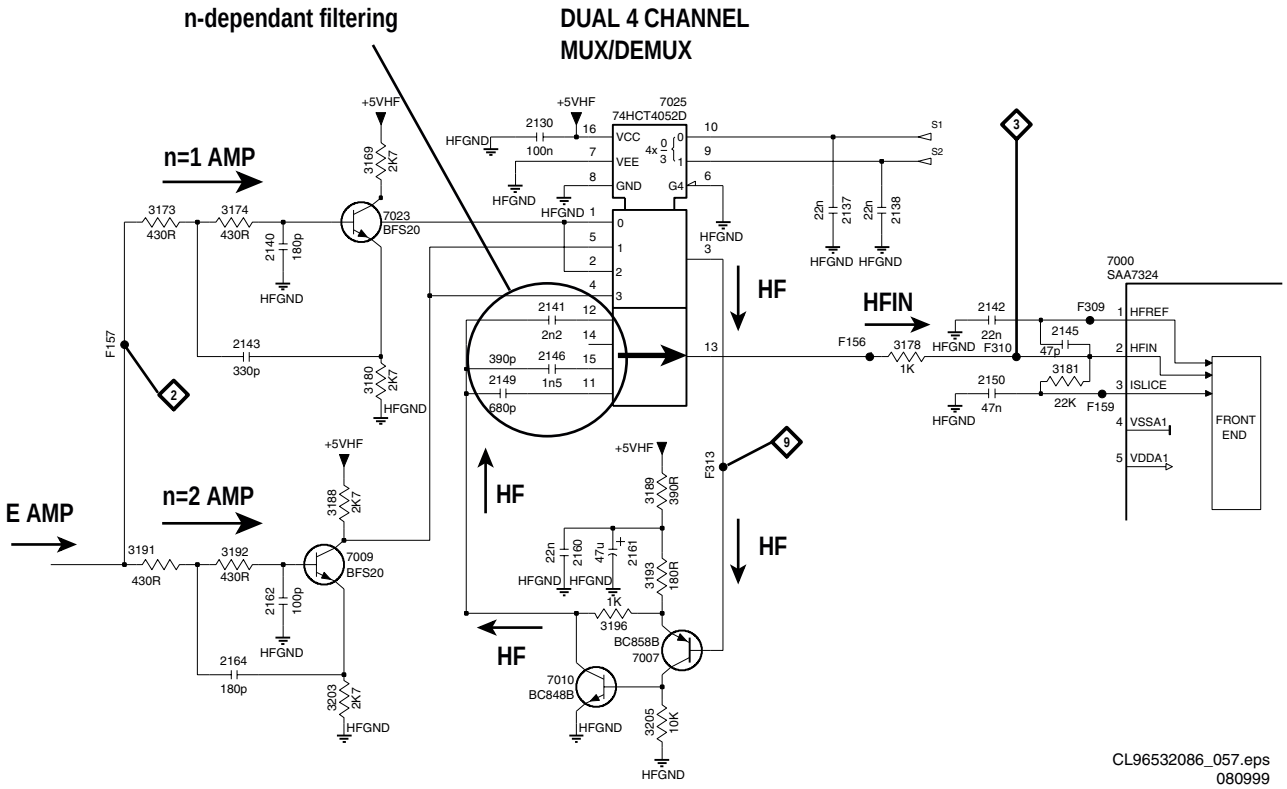


**Figure 8-28**

***DC Settings***

Set the power and reset connections as described above in "1.1.1. Supply Voltages". Check the following voltages :

| Force | Pin | Location | Measure |
|---|---|---|---|
| | Emitter | 7006 | 2.4 ±10% |
| S1 and S2 “HIGH” | Collector | 7010 | 1.9 ±10% |
| S1 and S2 “LOW” | Collector | 7010 | 1.9 ±10% |
| S1 and S2 “HIGH” | 13 | 7025 | 1.6 ±10% |
| S1 and S2 “LOW” | 13 | 7025 | 1.6 ±10% |
| S1 and S2 “HIGH” | 3 | 7025 | 3.2 ±10% |
| S1 and S2 “LOW” | 3 | 7025 | 3.2 ±10% |

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**Figure 8-29**

***Transfer Characteristics***
Set the power and reset connections as described above in "1.1.1. Supply Voltages". Connect a function generator via a serial resistor of 1k5 to pin 4 of connector 1000. Use the function generator as a sine wave generator with output level of 1Vtt. Check this AC value with an AC mV-meter connected to the input (pin 2) of the CD10 (7000) :

| Frequencies | S1 and S2 "low" | | S1 and S2 "high" | |
|---|---|---|---|---|
| | Input $V_{AC}$ | Pin 2 at 7000 | Input $V_{AC}$ | Pin 2 at 7000 |
| 300 Hz | 200mV | < 100mV ± 20% | 200mV | < 100mV ± 20% |
| 10 kHz | 200mV | 295mV ± 20% | 200mV | 330mV ± 20% |
| 100 kHz | 200mV | 310 mV ± 20% | 200mV | 330 mV ± 20% |
| 300 kHz | 200mV | 385 mV ± 20% | 200mV | 335 mV ± 20% |
| 800 kHz | 200mV | 655 mV ± 20% | 200mV | 485 mV ± 20% |
| 1.5 MHz | 200mV | 1.1V ± 20% | 200mV | 760 mV ± 20% |
| 3MHz | 200mV | 1.1V ± 20% | 200mV | 1.1V ± 20% |

CL96532086_059.eps
080999

**Figure 8-30**

***HFDET Setting***
Set the power and reset connections as described above in "1.1.1. Supply Voltages". Connect a function generator via a serial resistor of 1k5 to pin 4 of connector 1000. Use the function generator as a sine wave generator with output level of 500 kHz, 1Vtt. Check this AC value with an AC mV-meter :

| Location | Voltage DC | | Voltage AC |
|---|---|---|---|
| | No HF | HF | |
| F190 | 4.8V± 20% | 4.8V± 20% | 175mV± 20% |
| F192 | < 100mV | 1.1V± 20% | - |
| F206 | 4.9V± 20% | 150mV± 20% | - |

CL96532086_060.eps
080999

**Figure 8-31**

### 8.3.8 Audio Part - DAC

***Description***
The DAC used, is the UDA1320 bit stream, continuous calibration. I2S signals from various formats can be entered at pins 1,2 and 3. If these signals are in phase with the delivered system clock at pin 6, the DAC will reproduce analog output signals at pins 14 and 16. 0dB level is 0.85Vrms. These analog signals are at 1.65Vdc level.
The DAC has features which can be checked on the input pins. Mute will switch off the analog signals. De-emphasis is not used, since this is done in the decoder. Attenuation of -12dB is not used because this is also done in the decoder.

***I2S***
I2S is a kind of digital audio format, consisting out of 3 lines : CLOCK, WORDSELECT and DATA.

*WORD-SELECT*
Word select (WS) indicates whether the data-sample is from the left or the right audio-channel. It has the same frequency as the sample rate of the digital audio signal. This can be 32, 44.1 or 48kHz. Normal polarity is low for a left sample and high for a right sample. So within the low state of the WS-line the data bits for the left channel are transferred, and within the high state the data bits of the right channel are transferred.

*CLOCK*
The CLOCK signal (CLK) indicates when DataTips must be set, and when DataTips must be read. The frequency depends on the speed of the I2S-bus, but is always a factor of the frequency of the WS-signal. It can be 48x, 64x, 96, 128x... .In our case it is 48x the sample rate frequency = 2.1168MHz. The signal is in phase with the WS-signal. Transition of the WS always happens on a falling edge of the CLK.

*DATA*
DATA contains all data-bits. Data bits are set by the transmitting device, and read by the receiving device. The position of the DATA-bits within the WS-signal is very important. There are several formats for this. In our case we always use Philips I2S format, no Japanese or Sony format. The number of data-bits per channel depends on the used devices.

Timing of the I2S-bus, in case of Philips I2S is shown in the next figure :

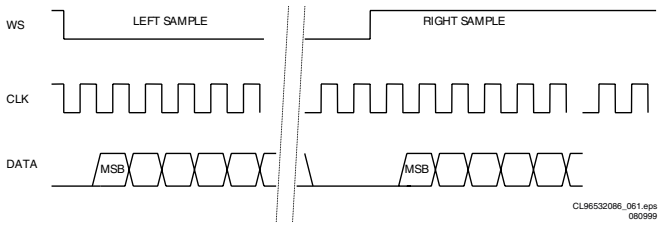



**Figure 8-32**

***Measurements***

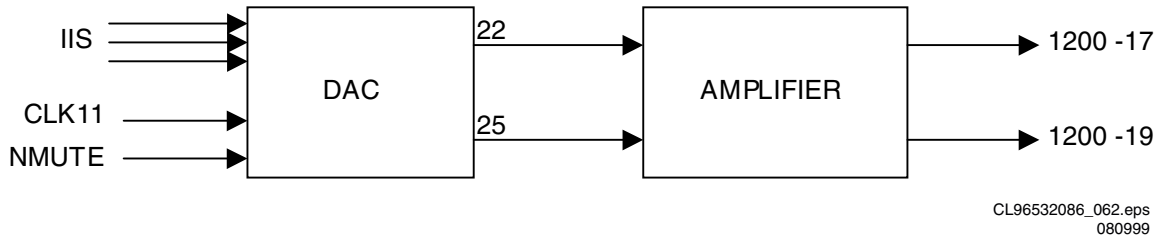
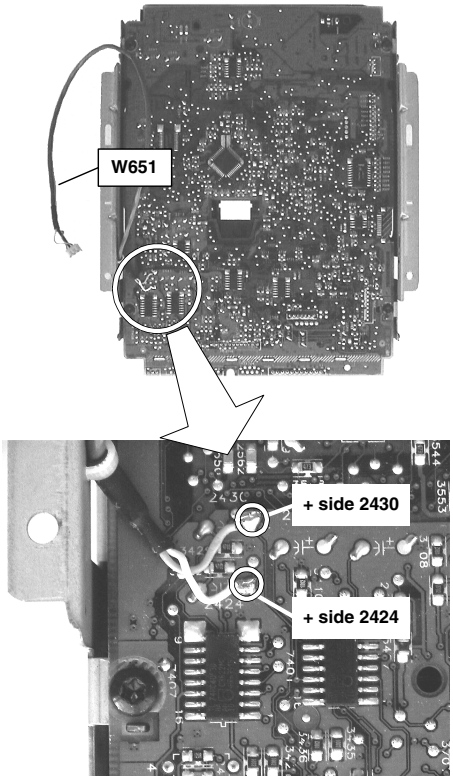



**Figure 8-33**

Keep processor 7202 in reset by forcing pin 7 of connector 1208 to +5V. This puts the processor outputs in tristate. Check the reset at pin 4 of processor 7202 to make sure that the processor is in reset.
Now, force port 0-4 pin 33 at 7202 to 0V to set the decoder outputs (SCLK, WCLK, DATA, and CL11).
Check the MUTE pin 11 at 7309 : this pin should be low.
Connect via an I2S generator I2S-signals to the DAC :
Pin 1 at 7309: SLCK.
Pin 2 at 7309: WCLK.
Pin 3 at 7309: DATA.
Connect also the SYSCLK pin 6 at position 7309 to a clock signal of 11.2896 MHz ±100ppm.
Generate an I2S signal equivalent with a sine wave of 1kHz at 0dB for both left and right channels.
Check if 0.8 VRMS at pins 14 and 16 at location 7209 with a DC of 1.65VDC.
Check if 1.7 VRMS ±2 dB at connector pins 1and 3 at location 1209.
Force MUTE Pin 11 at 7309 high.
Measure again at pins 1 and 3 at location 1209 : both signals should be at -90 dB.

## 9. WIRING DIAGRAM

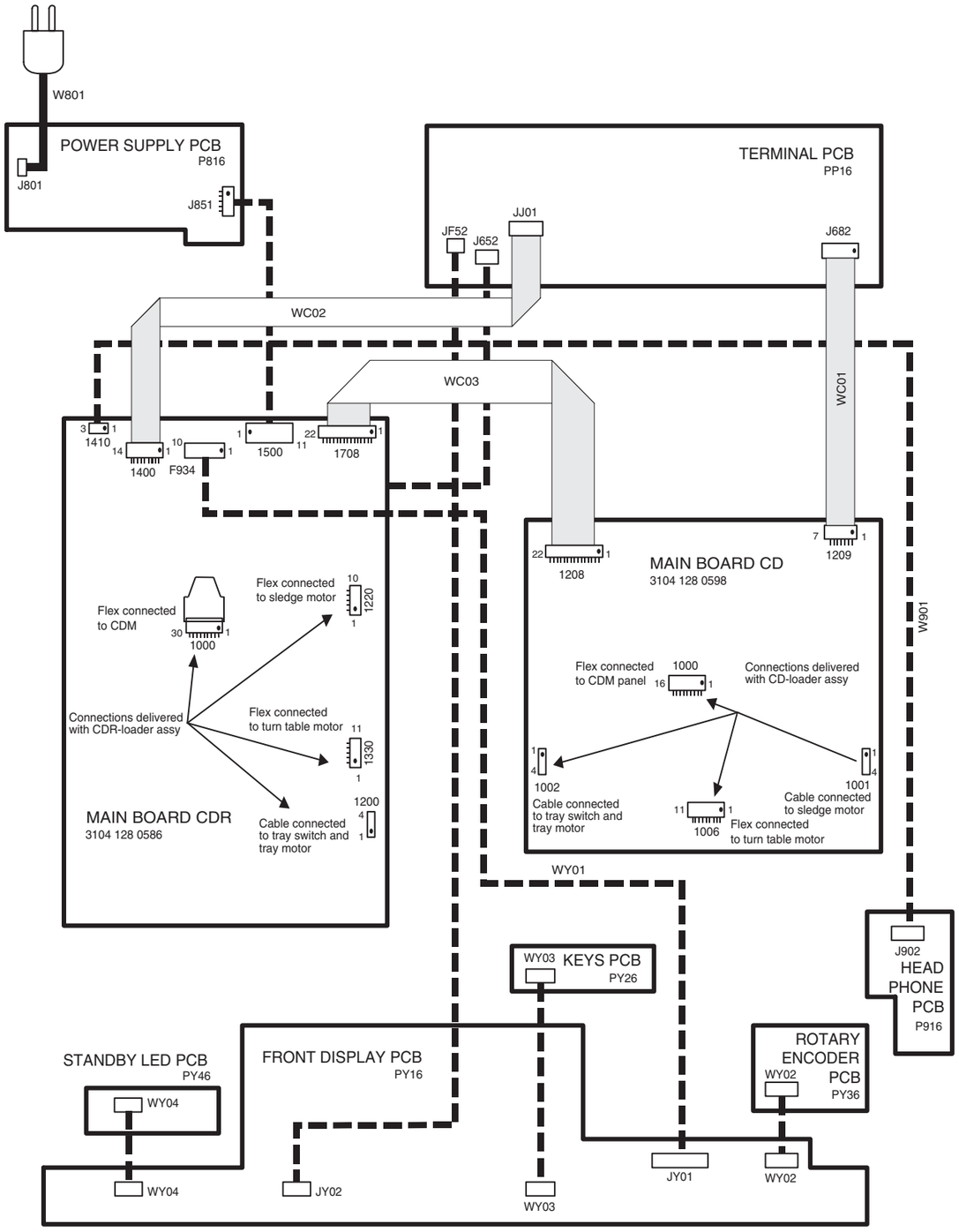
### DISMOUNTING ADDITIONAL CABLES




De-soldering and remove cables **W651** from the loader PCB.

**REMARK** When replace the CDR module MAR775 to the new one. It is necessary to add removed cables at same positions as follows;

- WHITE ▪▪▪▪ + side lead of capacitor 2424
- PINK ▪▪▪▪▪ + side lead of capacitor 2430

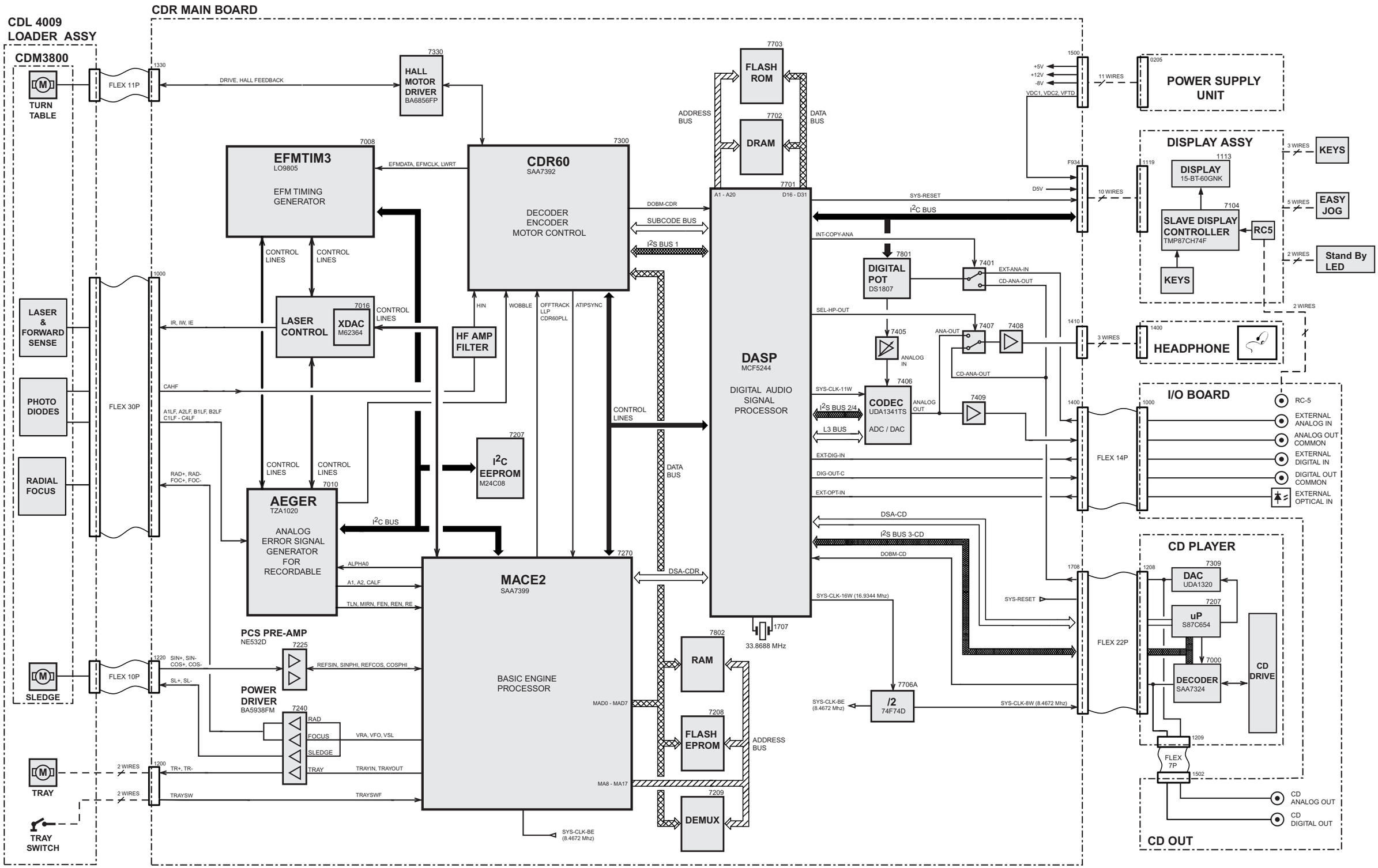



| | WY01(at conn.F934of CDR main board) | | WY02 | | WY03 | | WY04 |
|---|---|---|---|---|---|---|---|
| 1 | VDC2 | 1 | KEY | 1 | KEY | 1 | STAND BY |
| 2 | VFTD | 2 | KEY | 2 | KEY | 2 | GND |
| 3 | VDC1 | 3 | PULS | 3 | KEY | | |
| 4 | SYS RESET | 4 | PULS | | | | |
| 5 | IIC DATA | 5 | GND | | | | |
| 6 | GND | | | | | | |
| 7 | IIC CLOCK | | | | | | |
| 8 | DISPL INT | | | | | | |
| 9 | GND | | | | | | |
| 10 | D5V | | | | | | |

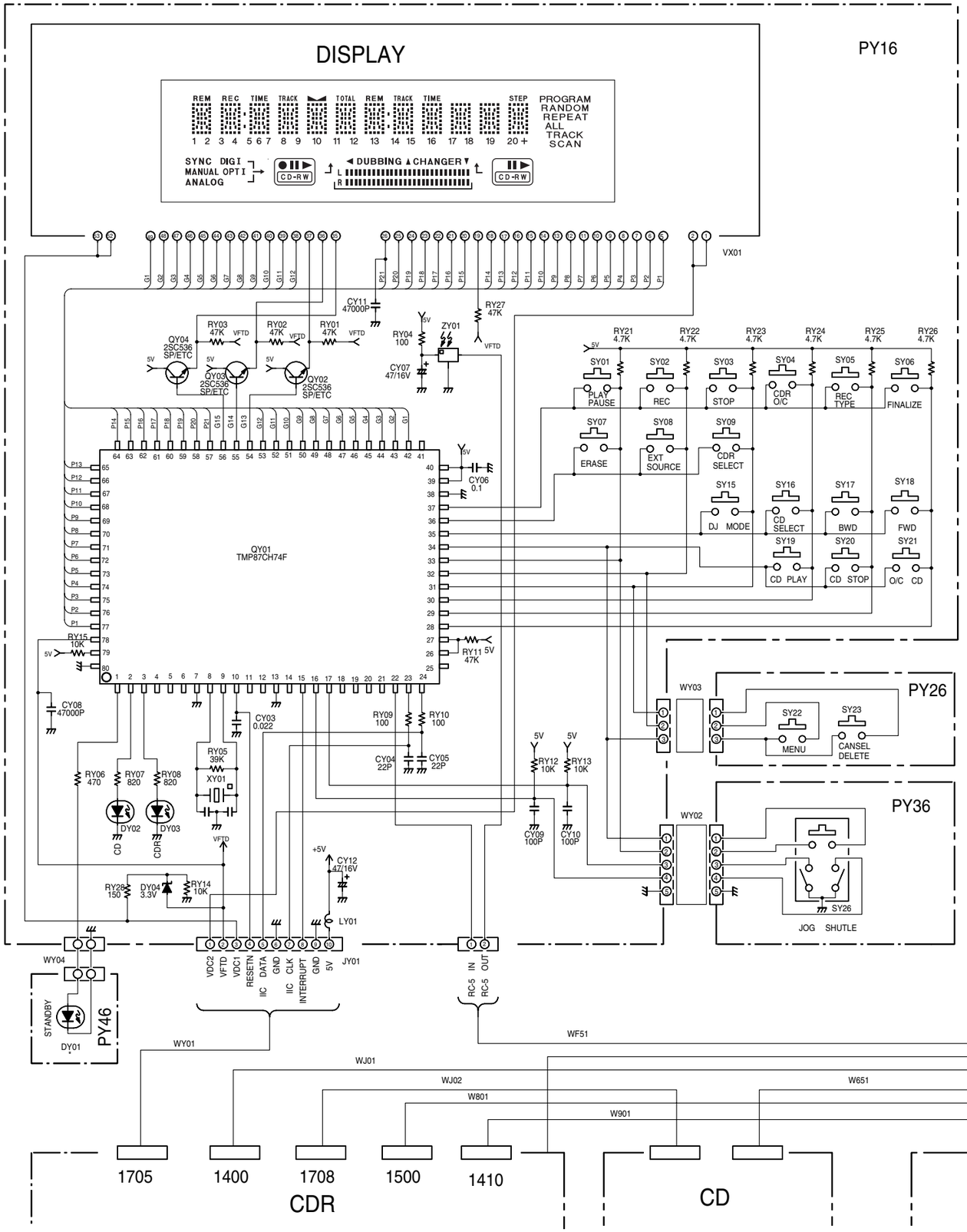
| | WC01(at conn.1209 of CDR main board) | | WC02(at conn.1400 of CDR main board | | WC03(at conn.1708 of CDR main board |
|---|---|---|---|---|---|
| 1 | RIGHT CD | 1 | GND | 1 | GND |
| 2 | GND | 2 | DOBM CDR | 2 | DSA DATA CD |
| 3 | LEFT CD | 3 | GND | 3 | GND |
| 4 | GND | 4 | EXT DIG IN | 4 | DSA STR CD |
| 5 | DOBM CD | 5 | EXT OPT IN | 5 | DSA ACK CD |
| 6 | GND | 6 | GND | 6 | GND |
| 7 | KILL | 7 | D5V | 7 | D5V |
| | | 8 | KILL | 8 | 12V CD |
| | | 9 | LEFT IN | 9 | GND |
| | W801(at conn.1500 of CDR main board) | 10 | GND | 10 | IIS DATA CD |
| | | 11 | RIGHT IN | 11 | IIS WS CD |
| 1 | VDC2 | 12 | RIGHT OUT | 12 | GND |
| 2 | VFT | 13 | GND | 13 | IIS BCK CD |
| 3 | VDC1 | 14 | LEFT OUT | 14 | GND |
| 4 | GND | | | 15 | DOBM CD |
| 5 | 5V | | | 16 | SYS RESET |
| 6 | 5V | | W801 | 17 | LEFT IN CD |
| 7 | GND | 1 | COLD | 18 | GND |
| 8 | GND | 2 | HOT | 19 | RIGHT IN CD |
| 9 | GND | | | 20 | KILL |
| 10 | 12V | | | 21 | SYS CLOCK 8W |
| 11 | •[,W,– | | | 22 | GND |

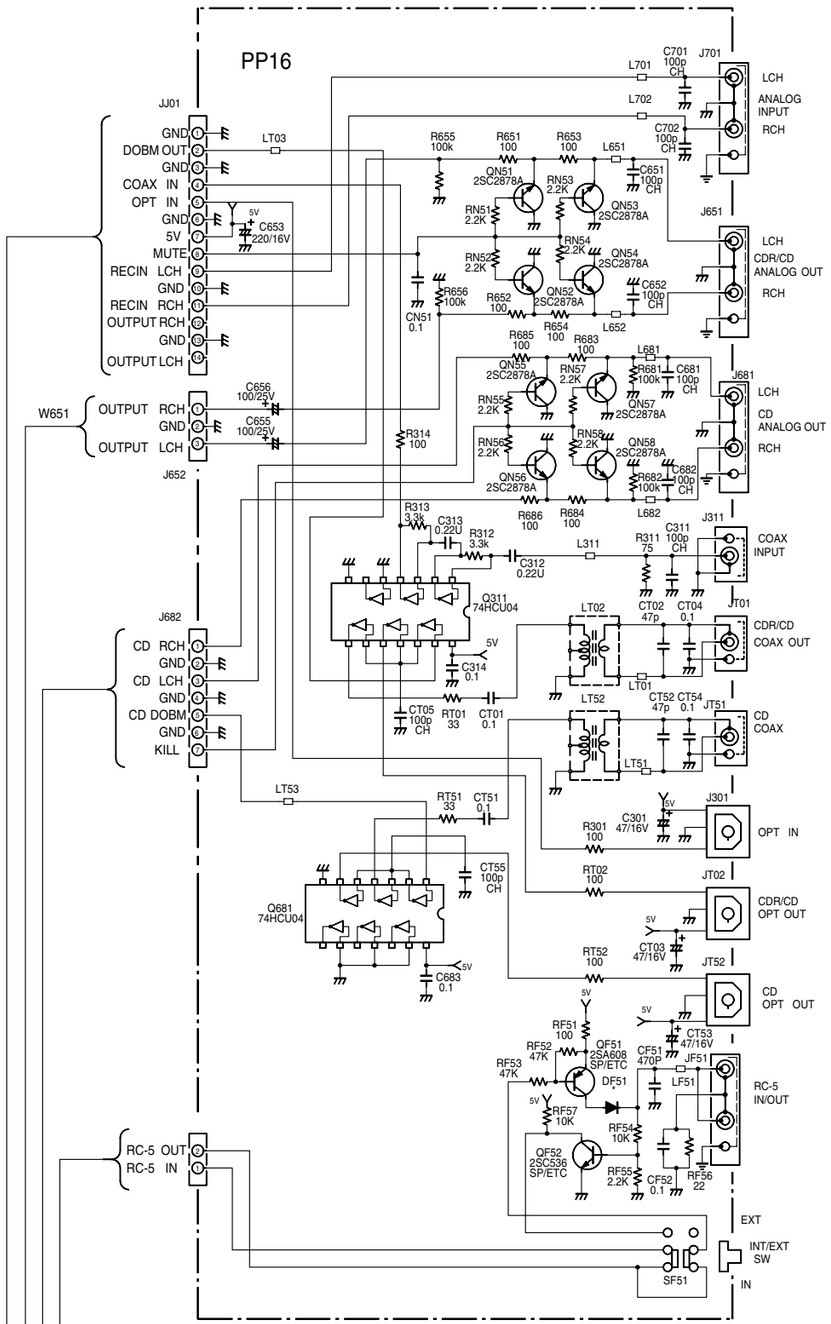
| | WF51 | | W901 | | W651 |
|---|---|---|---|---|---|
| 1 | RC-5 OUT | 1 | LEFT HP OUT | 1 | RIGHT CDR OUT |
| 2 | RC-5 IN | 2 | GND | 2 | GND |
| | | 3 | RIGHT HP OUT | 3 | LEFT CDR OUT |

## 10. BLOCK DIAGRAM

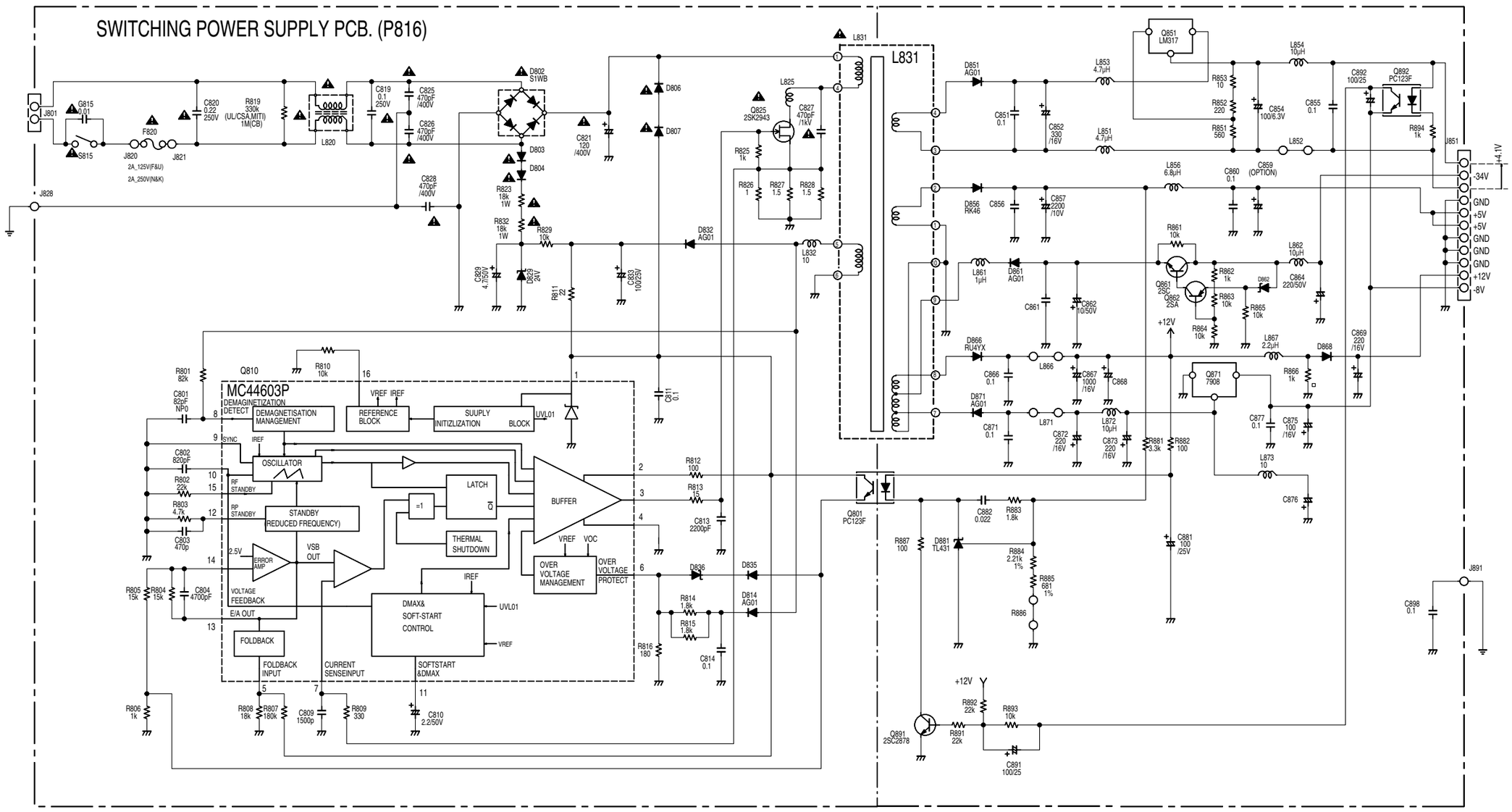


## 11. SCHEMATIC DIAGRAM AND PARTS LOCATION



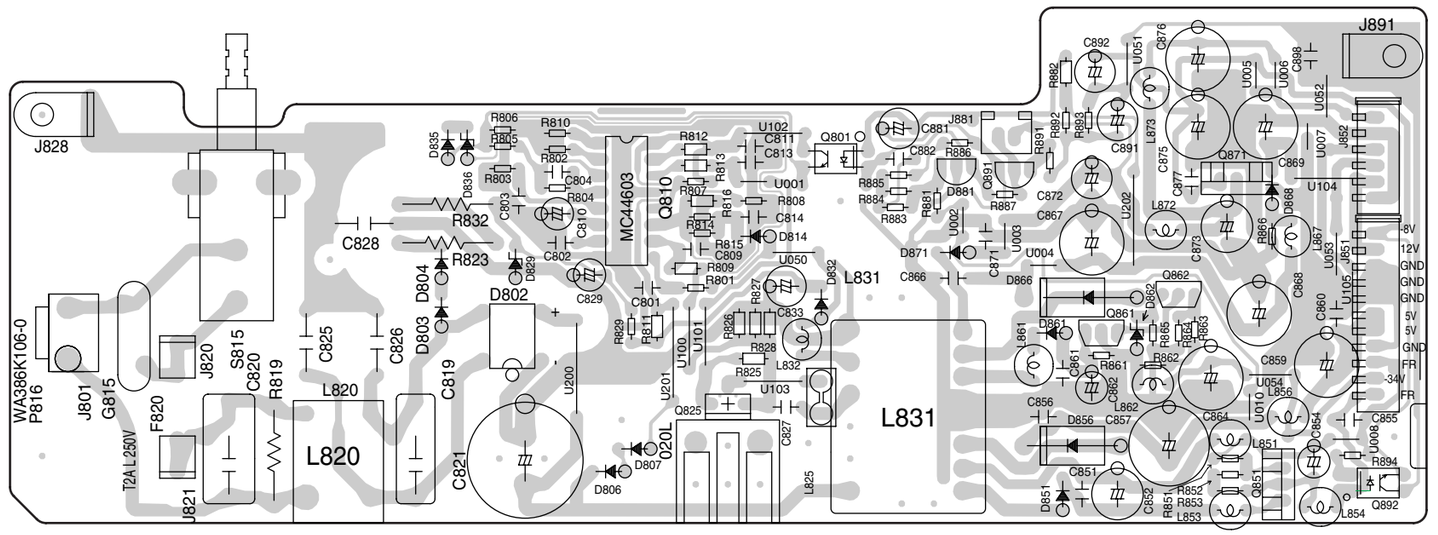


PP16
JJ01
GND DOBM OUT GND COAX IN OPT IN GND 5V MUTE RECIN LCH GND RECIN RCH OUTPUT RCH GND OUTPUT LCH
W651
OUTPUT RCH GND OUTPUT LCH
J652
J682
CD RCH GND CD LCH GND CD DOBM GND KILL
RC-5 OUT RC-5 IN
J701 LCH ANALOG INPUT RCH
J651 LCH CDR/CD ANALOG OUT RCH
J681 LCH CD ANALOG OUT RCH
J311 COAX INPUT
JT01 CDR/CD COAX OUT
JT51 CD COAX
J301 OPT IN
JT02 CDR/CD OPT OUT
JT52 CD OPT OUT
JF51 RC-5 IN/OUT
EXT INT/EXT SW IN
SF51
J902 P916 J901
LCH GND RCH
HEADPHONE

## SWITCHING POWER SUPPLY PCB. (P816)

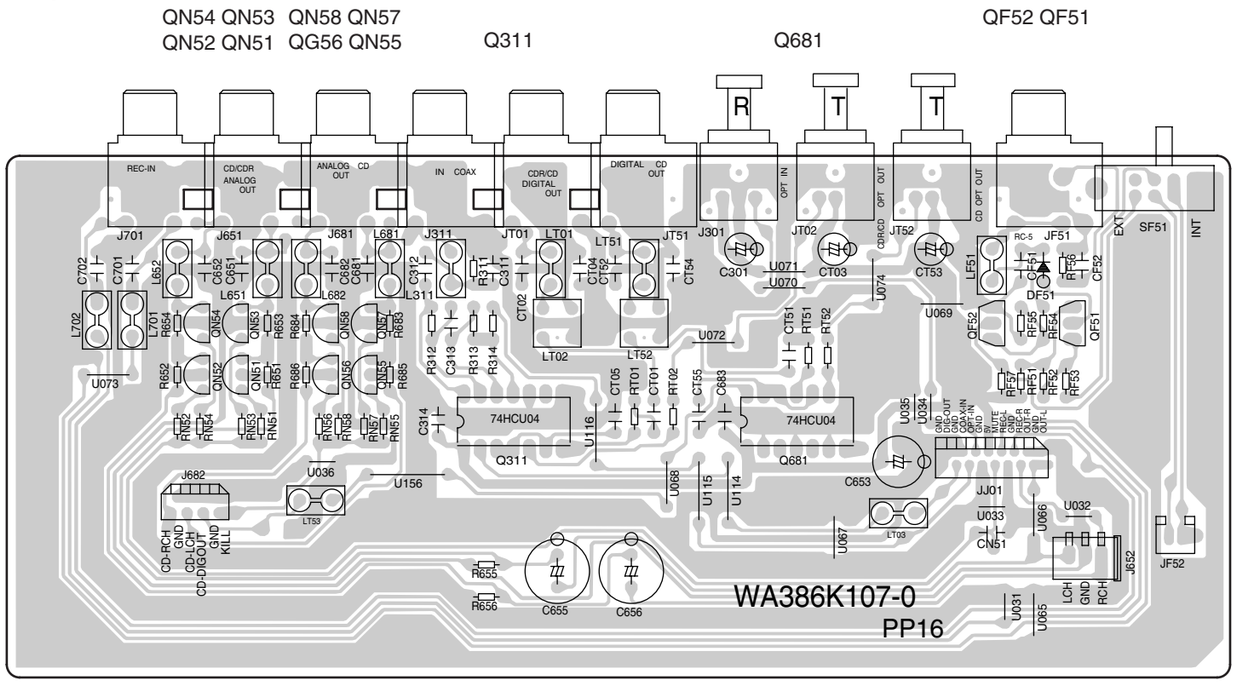



P816

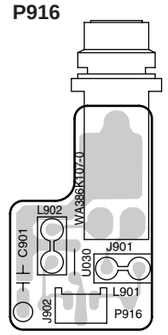
Q810 Q825 Q801 Q891 Q871 Q861 Q862 Q851 Q892



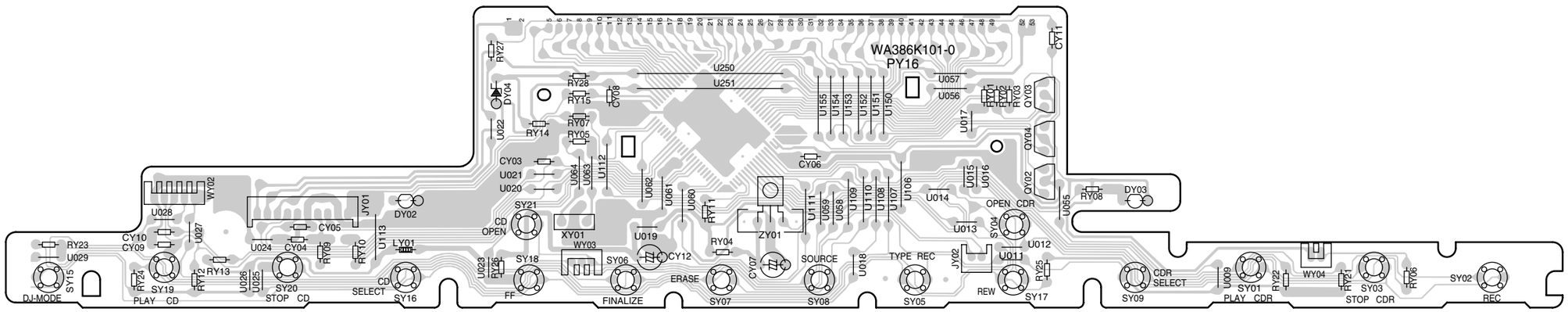
**PP16**



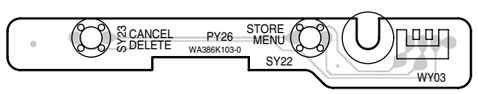

**P916**



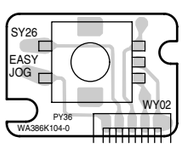

**PY16**




**PY26**




**PY36**

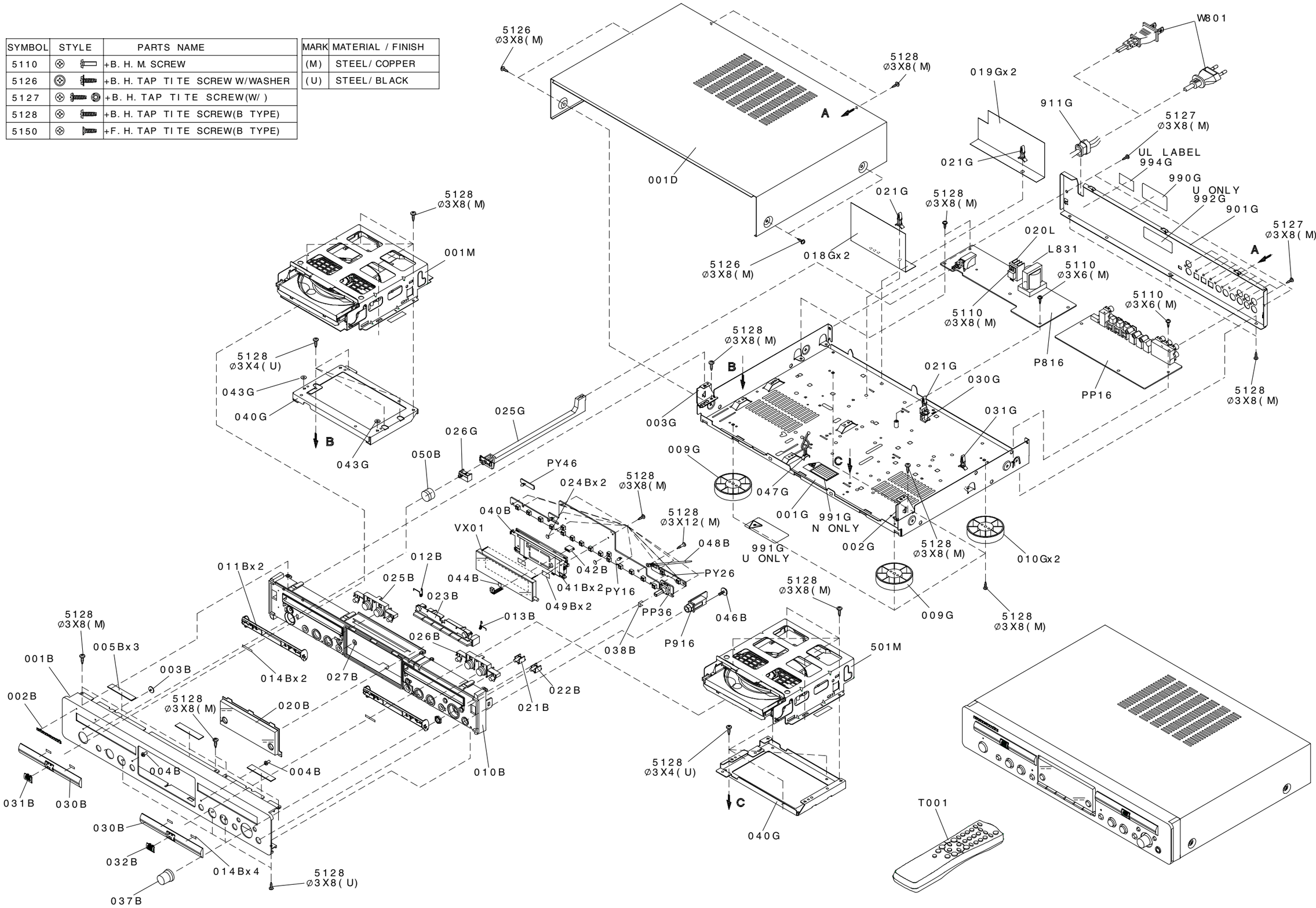



**PY46**

## 12. EXPLODED VIEW AND PARTS LIST

| SYMBOL | STYLE | PARTS NAME |
|---|---|---|
| 5110 | | +B. H. M. SCREW |
| 5126 | | +B. H. TAP TI TE SCREW W/WASHER |
| 5127 | | +B. H. TAP TI TE SCREW(W/ ) |
| 5128 | | +B. H. TAP TI TE SCREW(B TYPE) |
| 5150 | | +F. H. TAP TI TE SCREW(B TYPE) |

| MARK | MATERIAL / FINISH |
|---|---|
| (M) | STEEL/ COPPER |
| (U) | STEEL/ BLACK |



| POS. NO | VERS. COLOR | PART NO. (FOR PCS) | DESCRIPTION | PART NO. (MJI) |
|---|---|---|---|---|
| 001B | BLACK | 9965 000 06363 | FRONT PANEL AL BLK | 386K248010 |
| 001B | GOLD | 9964 000 06396 | FRONT PANEL AL GLD | 386K248110 |
| 002B | | 4822 454 11825 | BADGE MARANTZ BL PAINT | 185J251010 |
| 003B | | 9965 000 01393 | LENS STANDBY LED | 312J355010 |
| 004B | | 9965 000 06364 | LENS | 225K355020 |
| 010B | BLACK | 9965 000 06365 | CHASSIS | 386K105010 |
| 010B | GOLD | 9964 000 06397 | FRONT CHASSIS PL GLD | 386K105110 |
| 011B | | 9965 000 05925 | TRAY LID ARM | 386K257020 |
| 012B | | 9965 000 06366 | SPRING TRAY LID RIGHT | 386K115010 |
| 013B | | 9965 000 05926 | SPRING TRAY LID LEFT | 386K115020 |
| 020B | | 9965 000 06367 | WINDOW PINK SMOKE | 386K158010 |
| 021B | BLACK | 9965 000 06368 | BUTTON STORE/MENU BL | 386K270010 |
| 021B | GOLD | 9964 000 06398 | BUTTON STORE/MENU GL | 386K270110 |
| 022B | BLACK | 9965 000 06368 | BUTTON CANCEL/DELETE BL | 386K270010 |
| 022B | GOLD | 9964 000 06398 | BUTTON CANCEL/DELETE GL | 386K270110 |
| 023B | | 9965 000 06369 | BUTTON SEARCH ETC.BLK | 386K270030 |
| 025B | BLACK | 9965 000 06370 | BUTTON REC STOP PLAY BL | 386K270050 |
| 025B | GOLD | 9964 000 06399 | BUTTON REC STOP PLAY GL | 386K270150 |
| 026B | BLACK | 9965 000 06371 | BUTTON STOP PLAY L | 386K270060 |
| 026B | GOLD | 9964 000 06400 | BUTTON STOP PLAY L | 386K270160 |
| 030B | BLACK | 9965 000 05930 | ESCUTCHEON TRAY LID OUTER BL | 386K063010 |
| 030B | GOLD | 9964 000 05940 | ESCUTCHEON TRay lid OUTER GL | 386K063110 |
| 031B | BLACK | 9965 000 05931 | BADGE CD-RW BL | 386K251010 |
| 031B | GOLD | 9964 000 05941 | BADGE CD-RW GL | 386K251110 |
| 032B | BLACK | 9965 000 06372 | BADGE CD TEXT BL | 386K251020 |
| 032B | GOLD | 9964 000 06401 | BADGE CD TEXT GL | 386K251120 |
| 037B | BLACK | 9965 000 05932 | JOG KNOB BLK JOG KNOB BL | 386K154010 |
| 037B | GOLD | 9964 000 05942 | JOG KNOB GLD JOG KNOB GL | 386K154110 |
| 040B | | | FTD HOLDER FTD HOLDER | 370K271110 |
| 041B | | | STICKER ADHESIVE,FTD | 056J122050 |
| 046B | | | SCREW SCR. 010B + H.P.JACK | 183J010010 |
| 050B | BLACK | 9965 000 01975 | BUTTON POWER BL | 255W270010 |
| 050B | GOLD | 9964 000 01395 | BUTTON POWER GL | 255W270110 |
| 009G | | 4822 462 42129 | LEG GOLD HOT STAMP FRONT | 183J057010 |
| 010G | | 4822 462 42048 | LEG GOLD HOT STAMP REAR | 183J057110 |
| 025G | | 9965 000 00362 | LINK,POWER SW. | 349K121010 |
| 026G | | 9965 000 05933 | LINK EXTENSION | 386K121010 |
| 911G | /F | | BUSHING NIFCO 4516 | 085J259010 |
| 911G | /K,/N,/U | 4822 459 80744 | BUSHING NIFCO 2271 | 450H259010 |
| 001M | | | MECHANISM CD-R MODULE MAR775 | 388K304500 |
| 501M | | | MECHANISM CD MODULE VAL1250 | 386K304600 |
| WC01 | | 9965 000 06393 | FFC CABLE P=1.25 7PIN | YU07100530 |
| WC02 | | 9965 000 06394 | FFC CABLE P=1.0 14PIN | YU14300520 |
| WC03 | | 9965 000 06395 | FFC CABLE P=1.0 14PIN | YU22220520 |
| ⚠ W801 | /F,/K | | MAINS CORD E MAYOR | YC01800800 |
| ⚠ W801 | /N | 4822 321 11343 | MAINS CORD N MAYOR | YC01800790 |
| ⚠ W801 | /U | | MAINS CORD NON-INTEGRAL | YC02000880 |

| POS. NO | VERS. COLOR | PART NO. (FOR PCS) | DESCRIPTION | PART NO. (MJI) |
|---|---|---|---|---|
| | | | **PACKING** | |
| 001T | /F | | USER MANUAL F | 386K851110 |
| 001T | /K | | USER MANUAL ENG/CHI | 386K851350 |
| 001T | /N | 9965 000 06373 | USER MANUAL 9 LANG. | 386K851310 |
| 001T | /U | | USER MANUAL U | 386K851250 |
| 010T | | | USER MANUAL FLY SHEET | 386K851070 |
| J081 | /K | 4822 265 10092 | JACK AC ADAPTER | YJ04001240 |
| T001 | | 9965 000 05922 | REMOTE COMMANDER RC6050DR | ZK386K0010 |
| W001 | | 4822 321 62205 | RCA ST.CORD 1M GOLD | ZD01000550 |
| W002 | | 4822 321 62205 | RCA ST.CORD 1M GOLD | ZD01000550 |
| W003 | | 4822 321 62012 | RCA RC-5 CORD 0.8M | ZD00900100 |
| | | | **NOT STANDARD SPEAR PARTS** | |
| 001S | | | PACKING CASE | 386K801010 |
| 002S | | | CUSHION | 386K809010 |

## 13. ELECTRICAL PARTS LIST

ASSIGNMENT OF COMMON PARTS CODES.

***RESISTORS***

R✻✻✻: 1) GD05×××140, Carbon film fixed resistor, ±5% 1/4W
R✻✻✻: 2) GD05×××160, Carbon film fixed resistor, ±5% 1/6W
① —— Resistance value

Examples ;
① Resistance value

| | | | |
|---|---|---|---|
| 0.1 Ω .... 001 | 10 Ω .... 100 | 1 kΩ .... 102 | 100 kΩ .... 104 |
| 0.5 Ω .... 005 | 18 Ω .... 180 | 2.7 kΩ .... 272 | 680 kΩ .... 684 |
| 1 Ω .... 010 | 100 Ω .... 101 | 10 kΩ .... 103 | 1 MΩ .... 105 |
| 6.8 Ω .... 068 | 390 Ω .... 391 | 22 kΩ .... 223 | 4.7 MΩ .... 475 |

**Note** : Please distinguish 1/4W from 1/6W by the shape of parts used actually.

***CAPACITORS***

C✻✻✻: CERAMIC CAP.
3) DD1××××370, Ceramic capacitor
② ③ Disc type
Temp.coeff.P350 ～N1000, 50V
Capacity value
Tolerance

Examples ;
② Tolerance (Capacity deviation)
±0.25 pF .... 0
±0.5 pF .... 1
±5% .... 5
✻ Tolerance of COMMON PARTS handled here are as follows :
0.5 pF～ 5 pF .... ±0.25 pF
6 pF～ 10 pF .... ±0.5 pF
12 pF～ 560 pF .... ±5%
③ Capacity value

| | | |
|---|---|---|
| 0.5 pF .... 005 | 3 pF .... 030 | 100 pF .... 101 |
| 1 pF .... 010 | 10 pF .... 100 | 220 pF .... 221 |
| 1.5 pF .... 015 | 47 pF .... 470 | 560 pF .... 561 |

C✻✻✻ : CERAMIC CAP.
4) DK16××× 300, High dielectric constant ceramic capacitor
④ Disc type
Temp.chara. 2B4, 50V
Capacity value

Examples ;
④ Capacity value

| | | |
|---|---|---|
| 100 pF .... 101 | 1000 pF .... 102 | 10000 pF .... 103 |
| 470 pF .... 471 | 2200 pF .... 222 | |

C✻✻✻ : 5) ELECTROLY CAP. ( ⏚ ), 6) FILM CAP. ( ⏦ )
5) EA×××××× 10, Electrolytic capacitor
⑤ ⑥ One-way lead type, Tolerance ±20%
Working voltage
Capacity value

Examples ;
⑤ Capacity value

| | | | |
|---|---|---|---|
| 0.1 μF .... 104 | 4.7 μF .... 475 | 100 μF .... 107 | |
| 0.33 μF .... 334 | 10 μF .... 106 | 330 μF .... 337 | |
| 1 μF .... 105 | 22 μF .... 226 | 1100 μF .... 118 | |
| | | 2200 μF .... 228 | |

⑥ Working voltage

| | | |
|---|---|---|
| 6.3V .... 006 | 25V .... 025 | |
| 10V .... 010 | 35V .... 035 | |
| 16V .... 016 | 50V .... 050 | |

6) DF15××× 350 → Plastic film capacitor
DF15××× 310 One-way type, Mylar ±5% 50V
DF16××× 310 → Plastic film capacitor
⑦ One-way type, Mylar ±10% 50V
Capacity value

Examples ;
⑦ Capacity value

| | |
|---|---|
| 0.001 μF (1000 pF) ..... 102 | 0.1 μF .... 104 |
| 0.0018 μF ..... 182 | 0.56 μF .... 564 |
| 0.01 μF ..... 103 | 1 μF .... 105 |
| 0.015 μF ..... 153 | |

**NOTE** : 1) The above CODES ( R✻✻✻ , R✻✻✻ , C✻✻✻ , C✻✻✻ and C ✻✻✻) are omitted on the schematic diagram in some case.
2) On the occasion, be confirmed the common parts on the parts list.
3) Refer to "Common Parts List" for the other common parts (**RI05**, **DD4**, **DK4**).

NOTE ON SAFETY FOR FUSIBLE RESISTOR :

The suppliers and their type numbers of fusible resistors are as follows;

1. KOA Corporation

| Part No. (MJI) | Type No. (KOA) | Description |
|---|---|---|
| NH05×××140 | → RF25S××××ΩJ | (±5% 1/4W) |
| NH05×××120 | → RF50S××××ΩJ | (±5% 1/2W) |
| NH85×××110 | → RF73B2A××××ΩJ | (±5% 1/10W) |
| NH95×××140 | → RF73B2E××××ΩJ | (±5% 1/4W) |

✻ Resistance value — Resistance value (0.1 Ω – 10 kΩ)

2. Matsushita Electronic Components Co., Ltd

| Part No. (MJI) | Type No. (MEC) | Description |
|---|---|---|
| NF05×××140 | → ERD-2FCJ××× | (±5% 1/4W) |
| RF05×××140 | | |
| NF02×××140 | → ERD-2FCG××× | (±2% 1/4W) |
| RF02×××140 | | |

✻Resistance value — ✻Resistance value

Examples ;
✻ Resistance value

| | | | |
|---|---|---|---|
| 0.1 Ω .... 001 | 10 Ω .... 100 | 1 kΩ .... 102 | 100 kΩ .... 104 |
| 0.5 Ω .... 005 | 18 Ω .... 180 | 2.7 kΩ .... 272 | 680 kΩ .... 684 |
| 1 Ω .... 010 | 100 Ω .... 101 | 10 kΩ .... 103 | 1 MΩ .... 105 |
| 6.8 Ω .... 068 | 390 Ω .... 391 | 22 kΩ .... 223 | 4.7 MΩ .... 475 |

*ABBREVIATION AND MARKS*

| | | | |
|---|---|---|---|
| ANT. | : ANTENNA | BATT. | : BATTERY |
| CAP. | : CAPACITOR | CER. | : CERAMIC |
| CONN. | : CONNECTING | DIG. | : DIGITAL |
| HP | : HEADPHONE | MIC. | : MICROPHONE |
| μ-PRO | : MICROPROCESSOR | REC. | : RECORDING |
| RES. | : RESISTOR | SPK | : SPEAKER |
| SW | : SWITCH | TRANSF. | : TRANSFORMER |
| TRIM. | : TRIMMING | TRS. | : TRAMSISTOR |
| VAR. | : VARIABLE | X'TAL | : CRYSTAL |

**NOTE ON SAFETY :**

Symbol ⚠ Fire or electrical shock hazard. Only original parts should be used to replaced any part marked with symbol ⚠ . Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.

**安全上の注意：**

⚠がついている部品は、安全上重要な部品です。必ず指定されている部品番号の部品を使用して下さい。

| POS. NO | VERS. COLOR | PART NO. (FOR PCS) | DESCRIPTION | PART NO. (MJI) |
|---|---|---|---|---|
| | | | **P816-POWER** | |
| | | | **CIRCUIT BOARD** | |
| | | | **P816-CAPACITORS** | |
| C801 | | 9965 000 06375 | CER. 82 pF J 500V CH | DD15820550 |
| C810 | | 4822 124 40763 | ELECT. 2.2µF M 50V RA-2 | OA22505020 |
| C811 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C814 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| ⚠ C819 | | 9965 000 04979 | FILM ECQUL 0.1µF 250V AC | DF17104630 |
| ⚠ C820 | | 9965 000 06376 | FILM ECQUL 0.22µF 250V AC | DF17224570 |
| ⚠ C821 | | 9965 000 04981 | ELECT. 120µF 400V | EA12740070 |
| ⚠ C825 | | 9965 000 04980 | CER. 470P AC400V | DK17471520 |
| ⚠ C826 | | 9965 000 04980 | CER. 470P AC400V | DK17471520 |
| ⚠ C827 | | 9965 000 06377 | CER. 470P 1KV | DK16471560 |
| ⚠ C828 | | 9965 000 04980 | CER. 470P AC400V | DK17471520 |
| C829 | | 4822 124 80067 | ELECT. 4.7µF M 50V RA-2 | OA47505020 |
| C833 | | 4822 124 41535 | ELECT. 100µF M 25V RA-2 | OA10702520 |
| C851 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C852 | | 9965 000 06378 | ELECT. 330µF 16V RJB | EF337016P0 |
| C854 | | 4822 124 90353 | ELECT. 100µF M 10V RA-2 | OA10701020 |
| C855 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C856 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C857 | | 9965 000 06379 | ELECT. 2200µF 10V RJB | EF228010P0 |
| C860 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C861 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C862 | | 9965 000 06380 | ELECT. 10µF 50V RJB | EF106050P0 |
| C864 | | 4822 124 90366 | ELECT. 220µF M 50V RA-2 | OA22705020 |
| C866 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C867 | | 9965 000 06381 | ELECT. 1000µF 16V RJB | EF108016P0 |
| C868 | | 4822 124 80123 | ELECT. 220µF 16V ARS | OA22701640 |
| C869 | | 4822 124 80123 | ELECT. 220µF 16V ARS | OA22701640 |
| C871 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C872 | | 9965 000 06382 | ELECT. 220µF 16V RJB | EF227016P0 |
| C873 | | 4822 124 80123 | ELECT. 220µF 16V ARS | OA22701640 |
| C875 | | 4822 124 80123 | ELECT. 220µF 16V ARS | OA22701640 |
| C877 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C881 | | 4822 124 41535 | ELECT. 100µF / 25V | OA10702520 |
| C882 | | 4822 122 30103 | CER. 0.022µF 50V | DK18223310 |
| C891 | | 4822 124 41535 | ELECT. 100µF 25V | OA10702520 |
| C892 | | 4822 124 41535 | ELECT. 100µF 25V | OA10702520 |
| C898 | | 4822 122 40617 | CER. 0.1µF 50V | DD38104010 |
| G815 | | 4822 122 33276 | CER. DE7150 F 103M | DK17103840 |
| | | | **P816-CAPACITORS (COMMON)** | |
| C*** | | | HIGH DIELECTRIC CONSTANT | |
| | | | CER. CAPACITOR ±10% 50V : | |
| | | | C802-C804 C809 C813 | |
| | | | **P816-RESISTORS** | |
| R809 | | 4822 111 31001 | RES. 330Ω ±5% 1/6W | GG05331160 |
| R811 | | 4822 052 10229 | RES. 22Ω ±5% 1/6W | GG05220160 |
| R812 | | 4822 052 10101 | RES. 100Ω ±5% 1/6W | GG05101160 |
| R813 | | 9965 000 06391 | RES. 15Ω ±5% 1/6W | GG05150160 |
| R816 | | 9965 000 05893 | RES. 180Ω ±5% 1/6W | GG05181160 |
| ⚠ R819 | /F | 482211682449 | RES. 330kΩ K 1/2W ERC12GK | RC10334120 |
| ⚠ R819 | /K /N | 9965 000 00502 | RES. 1MΩ ±5% 1W RCR60 L15 | RC05105010 |
| ⚠ R819 | /U | | RES. 2.2MΩ 1/2W ERC12UG | RC10225820 |
| R823 | | 4822 053 10183 | RES. 18kΩ ±5% 1W | GA05183010 |
| R825 | | 4822 052 10102 | RES. 1kΩ ±5% 1/6W | GG05102160 |
| R826 | | 4822 116 82805 | RES. 1Ω ±5% 1/6W | GG05010160 |
| R827 | | 9965 000 06392 | RES. 1.5Ω ±5% 1/6W | GG05015160 |
| R828 | | 9965 000 06392 | RES. 1.5Ω ±5% 1/6W | GG05015160 |
| R832 | | 4822 053 10183 | RES. 18kΩ ±5% 1W | GA05183010 |
| R882 | | 4822 052 10101 | RES. 100Ω ±5% 1/6W | GG05101160 |
| R884 | | 4822 050 22212 | RES. 2.21kΩ ±1% 1/6W | GM11622110 |
| R885 | | 4822 050 26811 | RES. 681Ω ±1% 1/6W | GM11668100 |
| R886 | | | JUMPER | 75060501P0 |

| POS. NO | VERS. COLOR | PART NO. (FOR PCS) | DESCRIPTION | PART NO. (MJI) |
|---|---|---|---|---|
| | | | **P816-RESISTORS (COMMON)** | |
| R*** | | | CARBON FILM FIXED RES. | |
| | | | ±5% 1/6W : R801-R808 R810 | |
| | | | R814 R815 R829 R851-R853 | |
| | | | R861-R866 R881 R883 R887 | |
| | | | R891-R894 | |
| | | | **P816-SEMICONDUCTORS** | |
| ⚠ D802 | | 4822 130 81248 | DIODE S1WB(A)60 30A 600V | HD20031290 |
| ⚠ D803 | | 9965 000 00388 | DIODE AG01 400V 0.7A | HD20049080 |
| ⚠ D804 | | 9965 000 00388 | DIODE AG01 400V 0.7A | HD20049080 |
| ⚠ D806 | | 9965 000 00388 | DIODE AG01 400V 0.7A | HD20049080 |
| ⚠ D807 | | 9965 000 00388 | DIODE AG01 400V 0.7A | HD20049080 |
| ⚠ D814 | | 9965 000 00388 | DIODE AG01 400V 0.7A | HD20049080 |
| D829 | | 4822 130 80116 | ZENER DIODE 24V | HD32401000 |
| ⚠ D832 | | 9965 000 00388 | DIODE AG01 | HD20049080 |
| ⚠ D851 | | 9965 000 00388 | DIODE AG01 | HD20049080 |
| ⚠ D856 | | 4822 130 11074 | DIODE RK46 | HD20050080 |
| ⚠ D861 | | 9965 000 00388 | DIODE AG01 | HD20049080 |
| D862 | | 4822 130 34499 | ZENER DIODE 20V | HD32001000 |
| ⚠ D866 | | 9965 000 06383 | DIODE RU4AM 600V 2.0A | HD20051080 |
| D868 | | 9965 000 00388 | DIODE AG01 400V 0.7A | HD20049080 |
| ⚠ D871 | | 9965 000 00388 | DIODE AG01 | HD20049080 |
| D881 | | 9965 000 06384 | IC TL431 SHUNT REGULATOR | HC33036590 |
| ⚠ Q801 | | 4822 130 10431 | PHOTO UNIT PC-123F2 | HW10032320 |
| ⚠ Q810 | | 4822 209 90025 | IC MC44603P | HC10111170 |
| ⚠ Q825 | | 9965 000 00395 | F.E.T. 2SK2943 900V 3A | HF22943000 |
| ⚠ Q851 | | 9965 000 06390 | IC LM317 ADJ. REG. | HC31937590 |
| Q861 | | 4822 130 41947 | TRS. 2SC2458 2SC1740S | HT30001000 |
| | | | 2SC3199 ETC. | |
| Q862 | | 4822 130 42715 | TRS. 2SA1048 2SA933S | HT10001000 |
| | | | 2SA1267 ETC. | |
| ⚠ Q871 | | 9965 000 01744 | IC NJM7908FA | HC39908090 |
| Q891 | | 4822 130 43818 | TRS. 2SC2878 | HT328782A0 |
| Q892 | | 4822 130 10431 | PHOTO UNIT PC-123F2 | HW10032320 |
| | | | **P816-MISCELLANEOUS** | |
| ⚠ F820 | /F | | FUSE 2A 125V UL CSA MITI | FS10200350 |
| ⚠ F820 | /K /N | 4822 070 32001 | FUSE 2A 250V BS LISTED | FS10200850 |
| ⚠ F820 | /U | | FUSE 2A 125V | FS10200350 |
| | | | UL CSA MITI FBT | |
| ⚠ L820 | | 4822 157 70398 | LINE FILTER LF-4D-223 22MH | LC22260130 |
| L825 | | | FERRITE CORE | FC90050130 |
| | | | BL02RN2-R62T2 | |
| ⚠ L831 | | 9965 000 06385 | SWITCHING TRANSF. | TS12900010 |
| | | | ER2810SG | |
| L832 | | 9965 000 06386 | CHOKE COIL 10µH J% | LC11033900 |
| L851 | | 9965 000 06387 | CHOKE COIL 4.7µH J% | LC14723900 |
| L853 | | 9965 000 06387 | CHOKE COIL 4.7µH J% | LC14723900 |
| L854 | | 9965 000 06386 | CHOKE COIL 10µH J% | LC11033900 |
| L856 | | 9965 000 06388 | CHOKE COIL 6.8µH | LC16820110 |
| | | | PJ8R-6R8M | |
| L861 | | 4822 157 62681 | CHOKE COIL 1µH EL0405 | LC11023900 |
| L862 | | 9965 000 06386 | CHOKE COIL 10µH J% | LC11033900 |
| L867 | | 9965 000 06389 | CHOKE COIL 2.2µH | LC12220190 |
| | | | LHLC06TB2R2M | |
| L872 | | 9965 000 06386 | CHOKE COIL 10µH J% | LC11033900 |
| L873 | | 9965 000 06386 | CHOKE COIL 10µH J% | LC11033900 |
| ⚠ S815 | | 9965 000 05921 | PUSH SWITCH | SP01012480 |
| | | | ESB92S94B TV-5 1.5MM | |
| | | | **P916-HEAD PHONE** | |
| | | | **CIRCUIT BOARD** | |
| J901 | | 9965 000 01662 | JACK H.P JACK | YJ01003870 |
| | | | HLJ0540-01-410 BLK | |
| L901 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| L902 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |

| POS. NO | VERS. COLOR | PART NO. (FOR PCS) | DESCRIPTION | PART NO. (MJI) |
|---|---|---|---|---|
| | | | **PP16-REAR PANEL** | |
| | | | **CIRCUIT BOARD** | |
| | | | **PP16-CAPACITORS** | |
| C301 | | 4822 124 41539 | ELECT. 47µF M 16V RA-2 | OA47601620 |
| C311 | | 5322 122 32265 | CER. 100pF J CH 50V BLK | DD15101300 |
| C312 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C313 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C314 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C651 | | 5322 122 32265 | CER. 100pF J SL 50V GRN | DD15101300 |
| C652 | | 5322 122 32265 | CER. 100pF J CH 50V BLK | DD15101300 |
| C653 | | 4822 124 12404 | ELECT. 220µF 16V RA-2 | OA22701620 |
| C655 | | 4822 124 80119 | ELECT. 1000µF 25V ARS | OA10702540 |
| C656 | | 4822 124 80119 | ELECT. 100µF 25V ARS | OA10702540 |
| C681 | | 5322 122 32265 | CER. 100pF J CH 50V BLK | DD15101300 |
| C682 | | 5322 122 32265 | CER. 100pF J CH 50V BLK | DD15101300 |
| C683 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| C701 | | 5322 122 32265 | CER. 100pF J CH 50V BLK | DD15101300 |
| C702 | | 5322 122 32265 | CER. 100pF J SL 50V GRN | DD15101300 |
| CF51 | | | CER. 470pF ±10% | DK16471300 |
| CF52 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| CN51 | | 4822 122 40617 | CER. 50V DC 0.1µF +80-20% | DD38104010 |
| CT01 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| CT02 | | 4822 126 10513 | CER. 47pF | DA15470110 |
| CT03 | | 4822 124 41539 | ELECT. 47µF M 16V RA-2 | OA47601620 |
| CT04 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| CT05 | | 4822 126 10364 | CER. 100pF UP050B101K-A | DA16101110 |
| CT51 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| CT52 | | 482212610513 | CER. 47pF | DA15470110 |
| CT53 | | 4822 124 41539 | ELECT. 47µF M 16V RA-2 | OA47601620 |
| CT54 | | 4822 122 40617 | CER. 0.1µF +80%-20% 50V DC | DD38104010 |
| CT55 | | 4822 126 10364 | CER. 100pF UP050B101K-A | DA16101110 |
| CY11 | | 9965 000 00368 | CER. 0.047µF Z 50V | DA17473110 |
| | | | **PP16-RESISTOR** | |
| R311 | | 4822 111 41355 | RES. 75Ω ±5% 1/6W | GD05750160 |
| | | | **PP16-RESISTORS (COMMON)** | |
| R*** | | | CARBON FILM FIXED RES. | |
| | | | ±5% 1/6W : R312-R314 | |
| | | | R651-R656 R683-R686 | |
| | | | RF51-RF57 RN51-RN58 RT01 | |
| | | | RT02 RT51 RT52 | |
| | | | **PP16-SEMICONDUCTORS** | |
| DF51 | | 4822 130 32362 | DIODE 1SS176 MA165 1SS254 | HD20002000 |
| | | | 30V 0.1A | |
| Q311 | | 4822 209 63182 | IC LC74HCU04 | HC700400U0 |
| Q681 | | 4822 209 63182 | IC LC74HCU04 | HC700400U0 |
| QF51 | | 4822 130 42715 | TRS. 2SA1048 2SA933S | HT10001000 |
| | | | 2SA1267 ETC. | |
| QF52 | | 4822 130 41947 | TRS. 2SC2458 2SC1740S | HT30001000 |
| | | | 2SC3199 ETC. | |
| QN51 | | | | |
| ∫ | | 4822 130 43818 | TRS. 2SC2878 A | HT328781A0 |
| QN58 | | | | |
| | | | **PP16-MISCELLANEOUS** | |
| J301 | | 4822 218 11487 | OPT. CONNECTOR | YJ15000150 |
| | | | GP1F32R OPTICAL RECIVER | |
| J311 | | 4822 290 81638 | TERMINAL 14X14 RCA 1L1P | YT02010790 |
| J651 | | 4822 265 31045 | TERMINAL YKC21-3337 RCA | YT02021080 |
| J681 | | 4822 265 31045 | TERMINAL YKC21-3337 RCA | YT02021080 |
| J682 | | | JACK FFC CONNECTOR | YJ07011370 |
| | | | 07P 9604S-07C | |
| J701 | | 4822 265 31045 | TERMINAL YKC21-3337 RCA | YT02021080 |
| JF51 | | 4822 267 41009 | TERMINAL 2P RCA RC-5 | YT02020890 |
| JJ01 | | | JACK 14FMN-BTRK | YJ07019380 |
| JT01 | | 4822 290 81638 | TERMINAL 14X14 RA 1L1P BLK | YT02010790 |

| POS. NO | VERS. COLOR | PART NO. (FOR PCS) | DESCRIPTION | PART NO. (MJI) |
|---|---|---|---|---|
| JT02 | | 4822 267 31369 | OPT. CONNECTOR | YJ15000090 |
| | | | GP1F32T OPTICAL OUTPUT | |
| JT51 | | 4822 290 81638 | TERMINAL 14X14 RA 1L1P BLK | YT02010790 |
| JT52 | | 4822 267 31369 | OPT. CONNECTOR | YJ15000090 |
| | | | GP1F32T OPTICAL OUTPUT | |
| L311 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| L651 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| L652 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| L681 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| L682 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| L701 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| L702 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| LF51 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| LT01 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| LT02 | | 4822 142 60422 | PULSE TRANSF. | TP41042030 |
| | | | TPS247MN-0386AN | |
| LT03 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| LT51 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| LT52 | | 4822 142 60422 | PULSE TRANSF. | TP41042030 |
| | | | TPS247MN-0386AN | |
| LT53 | | | FERRITE BEAD | FC90050130 |
| | | | BL02RN2-R62T2 | |
| SF51 | | 4822 277 21559 | SLIDE SWITCH INT/EXT | SS02021150 |
| | | | **PY16-FRONT CIRCUIT BOARD** | |
| | | | **PY16-CAPACITORS** | |
| CY03 | | 4822 1224 0588 | CER. 0.022µF TP050F223Z | DA17223110 |
| CY04 | | 4822 1261 0362 | CER. 22pF | DA15220110 |
| CY05 | | 48221 261 0362 | CER. 22pF | DA15220110 |
| CY06 | | 9965 00000368 | CER. 0.047µF Z 50V | DA17473110 |
| CY07 | | 4822 124 21901 | ELECT. 47µF 6.3V | EJ47600610 |
| CY08 | | 9965 000 00368 | CER. 0.047µF Z 50V | DA17473110 |
| CY09 | | 4822 126 10364 | CER. 100pF UP050B101K-A | DA16101110 |
| CY10 | | 4822 126 10364 | CER. 100pF UP050B101K-A | DA16101110 |
| CY12 | | 4822 124 21901 | ELECT. 47µF 6.3V | EJ47600610 |
| | | | **PY16-RESISTORS (COMMON)** | |
| R*** | | | CARBON FILM FIXED RES. | |
| | | | ±5% 1/6W : | |
| | | | RY01-RY15 RY21-RY28 | |
| | | | **PY16-SEMICONDUCTORS** | |
| DY02 | | 4822 130 11569 | L.E.D. HLMF-K200 #2UL RED | HI10005340 |
| DY03 | | 4822 130 11569 | L.E.D. HLMF-K200 #2UL RED | HI10005340 |
| DY04 | | 5322 130 31504 | ZENER DIODE MTZ J 3.3A | HD30331000 |
| | | | **PY16-MISCELLANEOUS** | |
| QY01 | | 9965 000 06374 | MICROPROCESSOR | HU385KT000 |
| | | | TMP87CH74F | |
| QY02 | | | | |
| ∫ | | 4822 130 41947 | TRS. 2SC2458 2SC1740S | HT30001000 |
| QY04 | | | 2SC3199 ETC. | |
| LY01 | | 4822 157 62919 | CHOKE COIL 100µH J% | LC11043800 |
| SY01 | | | | |
| ∫ | | 4822 276 13732 | PUSH SWITCH SKQNAE | SP01013310 |
| SY09 | | | H/5MM 160GF | |

| POS. NO | VERS. COLOR | PART NO. (FOR PCS) | DESCRIPTION | PART NO. (MJI) |
|---|---|---|---|---|
| SY15 ∫ SY21 | | 4822 276 13732 | PUSH SWITCH SKQNAE H/5MM 160GF | SP01013310 |
| VX01 | | 9965 000 05916 | DISPLAY UNIT FTD BJ727GNK 15GRID X 22ANODE | HQ31208410 |
| XY01 | | 4822 242 72066 | SERAMIC VIB. CST8.0MHZ MT | FQ08004010 |
| ZY01 | | 4822 130 11494 | IR SENSOR RPM6936-V4 | HW10004210 |
| | | | **PY26-KEY CIRCUIT BOARD** | |
| SY22 | | 4822 276 13732 | PUSH SWITCH SKQNAE H/5MM 160GF | SP01013310 |
| SY23 | | 4822 276 13732 | PUSH SWITCH SKQNAE H/5MM 160GF | SP01013310 |
| | | | **PY36-ROTARY ENCODER CIRCUIT BOARD** | |
| SY26 | | 9965 000 05915 | ROTARY SWITCH EC11B WITH PUSH SW | SR03030030 |
| | | | **PY46-LED CIRCUIT BOARD** | |
| DY01 | | 4822 130 11569 | L.E.D. HLMF-K200 #2UL RED | HI10005340 |